

Risks and Risk Management in Heavy Lift Transport from Finland to Norway

A qualitative study about the risks and challenges involved in the transportation of heavy lift

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Abstrakt

I detta examensarbete undersöktes risker och riskhantering vid transport av Heavy lift från Finland till Norge. Syftet med examensarbetet var att ta reda på vilka risker som kan uppstå vid transporten samt vilka utmaningar och problem man kan stöta på under transport till Norge. Examensarbetet tar också upp några eventuella sätt att undvika dessa risker och utmaningar.

Detta examensarbete gjordes på uppdrag av ett internationellt industriföretag som drivs i Österbotten. Målet med examensarbetet var att identifiera de risker och utmaningar som påverkar transport av Heavy lift och ge allmänna riktlinjer till uppdragsgivaren över vilka risker och utmaningar som borde beaktas vid försäljningstillfället.

I teoridelen tillämpades litteratur som behandlade risker, riskhantering, logistik och distribution. Heavy lift redogörs i arbetet med hjälp av information från intervjuerna, eftersom det inte finns särskilt mycket skrivet om Heavy lift i litteraturen. För att identifiera riskerna och utmaningarna så utfördes en kvalitativ undersökning med hjälp av intervjuer i den empiriska delen av examensarbetet. Intervjuerna gjordes speciellt med export- och transportpersonal.

Resultatet visade att den vanligaste orsaken till utmaningar och risker i transporten orsakas av de strikta reglerna för vägtransport i Norge, vilka i sin tur begränsar vägtransporten för Heavy lift. Landskapet och väderförhållandena bör beaktas i transporten för att undvika förseningar i leveransen. Dessutom visade resultatet att det var viktigt att se till att dokumenten är felfria och överlämnade i tid. Det kunde konstateras att genom att uppge detaljerad information till alla parter och genom en utförlig planering kan de flesta risker och utmaningar inom transporten undvikas.

Språk: Engelska

Nyckelord: Norge, transport, risker, riskhantering, logistik, heavy lift, utmaningar

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Tiivistelmä

Tämä opinnäytetyö käsittelee riskejä ja riskien hallintaa Heavy lift -kuljetuksissa Suomen ja Norjan välillä. Opinnäytetyön tarkoitus oli tunnistaa ne riskit, haasteet ja ongelmat, joihin voi kohdata kuljettaessa Heavy liftiä Norjaan. Opinnäytetyö tuo myös esille muutaman mahdollisen tavan edistää kyseisiä riskejä ja haasteita.

Tämä opinnäytetyö on tehty Pohjanmaalla toimivan kansainvälisen teollisuusyrityksen toimeksiantona. Työn tavoite oli tunnistaa ne riskit ja haasteet, jotka koskevat Heavy lift -kuljetuksia ja tämän perusteella antaa toimeksiantajalle yleistä ohjeistusta niistä riskeistä ja haasteista, jotka kuuluisi ottaa huomioon myynnin yhteydessä.

Opinnäytetyön teoreettisessa osassa käydään läpi kirjallisuutta riskeistä, riskien hallinnasta, logistiikasta ja jakelusta. Tässä työssä Heavy liftiä kuvaillaan haastatteluista saadulla tiedolla. Selvittääkseen kuljetukseen liittyvät riskit ja haasteet empiirinen osa toteutettiin laadullisena tutkimuksena haastattelujen avulla. Haastattelut toteutettiin erityisesti vienti- ja kuljetusasiantuntijoiden kanssa.

Tämän tutkimuksen tulokset osoittivat, että riskit ja haasteet Heavy lift -kuljetuksissa johtuu useasti Norjan tiukoista tieliikennesäännöistä, jotka puolestaan rajoittavat Heavy liftin kuljettamista teitse. Välttääkseen myöhästymisiä toimituksissa, Norjan maasto sekä sääolosuhteet kannattaa ottaa huomioon kuljetuksissa. Tämän lisäksi tulokset osoittivat, että on tärkeää varmistaa, että asiakirjat ovat virheettömiä ja toimitetaan ajallaan. Tulosten perusteella voitiin päätellä, että välittämällä yksityiskohtaista tietoa kaikille osapuolille, sekä yksityiskohtaisen suunnittelun avulla, suurin osa kuljetusriskeistä ja haasteista voitiin edistää tai välttää.

Kieli: englanti

Avainsanat: Norja, kuljetus, riskit, riskienhallinta, logistiikka, heavy lift, haasteet

BACHELOR'S THESIS

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Appendices 2

Abstract

In this thesis the risks and risk management in Heavy lift transport from Finland to Norway were examined. The objective of this thesis was to identify the risks that can arise during transport of Heavy lift and what challenges and difficulties can be encountered during transport to Norway. In addition, this thesis reveals a few possible ways of preventing these risks and challenges.

This thesis was commissioned by an international manufacturing company that operates in Ostrobothnia. The goal of this thesis was to identify the risks and challenges that affect the transport of Heavy lift and give general guidelines to the commission company about the risks and challenges that should be considered in the time of sale.

In the theoretical part of this thesis literature about risks, risk management, logistics and distribution were applied. Heavy lift is introduced in this thesis with material from the interviews. In order to find out what the risks and challenges were, a qualitative research was conducted with the help of interviews in the empirical part. The interviews were executed mainly with export and transport professionals.

The results of this research revealed that the strict regulations for road transport, which limit the Heavy lift transport by road, in Norway is the most common reason for challenges and risks in transport. The nature and weather conditions in Norway should be considered in order to avoid delays in delivery. Additionally, the results revealed that it was important that the documents were correct and provided in time. It could be concluded that by providing detailed information to all parties involved in the transport and having an extensive planning, most of the challenges and risks could be prevented.

Language: English

Key words: Norway, transport, risks, risk management, logistics, heavy lift, challenges

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1 INTRODUCTION

In this thesis, the risks and challenges included in the transportation of heavy lift from Finland to Norway are examined. This thesis is commissioned by an international manufacturing company that operates in Ostrobothnia. The company manufactures energy and technology products that are transported worldwide.

The goal of this thesis is to identify the risks and challenges that can arise during transportation of Heavy lift from Finland to Norway, and provide the commission company with general guidelines of the risks and challenges that should be considered in the time of sale in order to avoid additional costs.

There are many types of risks that can occur during several different stages, in different forms and with different consequences. Every risk cannot be identified, but there are several tools used in order to identify, analyze and respond to risks (Waters 2011). These are the steps in risk management and will be included in the theoretical part of this thesis.

Furthermore, the theoretical part of this thesis deals with literature about risks and risk management in supply chains and important aspects of logistics and distribution that are relevant for this thesis. The empirical part of this thesis includes the results from the qualitative interviews and an analysis of the results that was given. The thesis is finished up with a conclusion and discussion about the research and results achieved.

1.1 Background

The interest to this topic rose while working as a trainee with export at the commission company. The assignments that I had included among other things organizing transport for heavy lift shipments. While working in this position we encountered some challenges in my team, which made me eager to learn more about the challenges and risks involved in the transport, especially to Norway.

This study is present for commission company because there is a general need of integrated directions for what risks there are and how the risks should be managed in the transportation of heavy lift to countries outside of the EU, such as Norway. This thesis is made to improve the awareness about the risks involved in the transportation of heavy lift in the company. Furthermore, this study is executed to identify the risks involved in the transport to be able to strengthen the prevention of these risks.

1.2 Objective and goal

The objective of this study is to identify the risks and challenges involved in the transportation of heavy lift goods from Finland to Norway. The goal of this study is to successfully identify the risks and challenges in the transport of heavy lift to Norway and provide the commission company with general guidelines of what risks and challenges should be considered in the time of sale.

1.3 Problem statement

For this research it is needed to gain insight into the risks involved in the transport of heavy lift transportation from Finland to Norway in order to gain insight into the prevention of these risks. The risks in transport often cause a company additional costs or delays in delivery when the risks have not been identified in time. This is a problem because it might affect a company negatively and cause a loss in business.

The consequences that can occur is one of the reasons why this issue is examined. In order to prevent these risks from happening, it is needed to identify the risks involved in the transportation of heavy lift. When the risks are identified, general guidelines can be provided on what risks and challenges should be prevented and prepared for in the future. There is a clear need of general instructions for these kinds of issues in the company and with my research I would contribute with recommendations on those risks that should be considered in the time of sale in order to prevent additional costs.

1.4 Research questions

There are three key questions that this thesis deals with:

- What is important to consider with the transportation of heavy lift?
- What challenges and risks are there with heavy lift transport from Finland to Norway?
- How could these challenges and risks be prevented and how could you prepare for them?

1.5 Delimitation

The thesis is delimited to the transport from Finland to Norway, further it is delimited to the transport of heavy lift. The thesis will not include information after delivery of goods or information about the transport of goods from Norway to Finland.

This thesis will only include information about the transport from Finland to Norway and relevant information linked to the logistics and distribution. Based on my problem statement and objective for this research this thesis can be delimited into three parts: heavy lift, risks and risk management, distribution and logistics including aspects that should be considered in international logistics, such as documentation, modes of transport and terms of delivery.

2 METHODOLOGY

In this part of the thesis different research methods will be described. The research methods that are discussed are quantitative and qualitative research methods. The choice of research method for this study will also be included in this chapter.

2.1 Quantitative research method

Quantitative research studies the connections between variables that are measured with numbers and examined using several statistical and graphical methods. In qualitative research, data is usually obtained using questionnaires and other structured methods, such as structured observations (experiments) or interviews. The results collected through qualitative research are usually numerical. (Saunders, Lewis & Thornhill 2019, 175-178)

2.2 Qualitative research method

Qualitative data is obtained by verbal, textual and visual data. Verbal data is obtained by spoken words or audio recordings, textual data is for instance obtained from the notes of observations and interviews and visual data can be obtained in many forms, which includes images, drawings and videos. A qualitative research method will give non-numerical results that differ from the quantitative research method, where results are analyzed with the help of statistics giving numerical results. (Saunders et al. 2019, 179-180)

2.3 Choice of research method

The research method that has been selected for this study is the qualitative research method. My research strategy is to execute qualitative interviews mainly with export and transport professionals. The qualitative research method was selected because more in-depth information is needed for this research, and this kind of information will be gained by executing qualitative interviews. The research method and results of this research will be discussed more specifically in Chapter 4 Empirical framework.

3 THEORETICAL FRAMEWORK

The theoretical understanding in this thesis is rather important since the transport of heavy lift is quite complex and requires theoretical knowledge and experience in order to understand the topic. The theoretical part in my thesis is central for this research because it gives a sense of direction and increases the understanding for the reader, especially for someone that is not familiar with the topic from before.

The theoretical part of this thesis will include information about the general information about risks, risk management, distribution and logistics relevant to the transportation of goods. Some information about the target country Norway will also be included, and some of the regulations linked to the transportation are mentioned. The definition of heavy lift and other relevant vocabulary for this research will be included and explained in the theoretical part.

3.1 Heavy lift

This thesis is commissioned by an international manufacturing company that operates in Ostrobothnia. This thesis is delimited to the transport of heavy lift and because of this the concept of heavy lift is introduced in this chapter. The commission company manufactures goods that are categorized as heavy lift, that are transported worldwide.

The definition of heavy lift was determined by personal communication with a Customer Service Specialist that works for the commission company. The information listed in the table below, also referred to as Figure 1 provides information about what a heavy lift shipment is and how it is defined in the commission company.

The definition of heavy lift is individual for each company and country (Personal communication with Transport Manager 2.11.2020) and this thesis is based on the definition used in the commission company, that is provided in the table below.

Number	Scenarios
1	Shipments (heavy lift, general cargo or both) under a single project from various origins going into one or multiple destinations
2	Heavy lift cargo (>25 tons) international or domestic transports
3	Heavy lift cargo (>25 tons) and general cargo under a single project
4	Shipments with a value of 500.000 USD per item value
5	Oversized cargoes that are less than 25 tons, but more than 3,4 meters width or more than 3,30 meters height
6	Oversized cargoes that are less than 25 tons, but less than 3,4 meters width or less than 3,30 meters height

Figure 1. Definition of heavy lift in the commission company

Heavy lift are goods or a shipment that differs from the standard goods or shipment with its weight and/or measurements and requires special transportation permits and possible special arrangements due to its size (Personal communication with Heavy lift and Project Cargo Coordinator 29.10.2020). According to the table, a shipment is categorized as heavy lift when the value of the goods is 500.000 USD or when the shipment weighs over 25 tons. The shipment can also weigh less than 25 tons but have a width of more than 3,4 meters or a height more than 3,30 meters, and still be categorized as heavy lift. Basically, if any of the criteria mentioned in the table is fulfilled, the shipment is categorized as heavy lift (Personal communication with Customer Service Specialist 11.11.2020).

3.1.1 Difference between general cargo and project cargo

In this chapter the differences between general cargo and project cargo is determined. As described in the previous chapter heavy lift concerns a heavy shipment, and due to this it doesn't fit into the frames of general cargo. Heavy lift falls into the category of project cargo because of its size. Determining the difference between these cargoes increases the understanding of the reader, which makes it relevant for this thesis.

General cargo are goods that can be handled and transported individually and does not change form during transport. General cargo comes in many shapes and forms, they can be either small or large, packed or unpacked and contain just one material or several materials. Typical features for general cargo include parts for assembly or manufacturing, boxes, containers, cans, etc. General cargo can be divided by quantity, function and shape. (Martin 2018, 73-75)

When transporting general cargo an understanding of the features of the cargo is important. These features include the geometric features such as the measurements, shape and surface. Physical and chemical features such as the kind of material, cargo sensitivity and mechanics. Other features, such as if the cargo is stackable, can it be dragged or pushed, etc. (Martin 2018, 73-75)

Project cargo is a broad concept, also known as project logistics and project forwarding, refers to large, high-value and complex parts of equipment that can be transferred by road, sea, rail and air (LogisticsPlus, 2018). The transportation of project cargo might include one or several shipments, with one or several modes of transport (LogisticsPlus, 2018).

Usually, there are certain characteristics of a project that needs to be fulfilled in order to be categorized as a project. These characteristics include a clear goal and a limited timeframe, moreover a project should be exceptional and complex. Project cargo transportation is characterized by needing special equipment and since projects are complex it involves risk, which requires flexibility both in thinking and finance. Lastly, a project is characterized by being a subject of limitations, this means that there will always be limitations, whether it concerns bad weather that causes limitations or the lack of resources, there will be limitations involved. (Rushton, Croucher & Baker 2017, 617-619)

Out of gauge cargo is cargo that falls into the category of project logistics and is cargo that go beyond the dimensions of equipment used in transportation. Out of gauge cargo in container shipping exceeds the internal measurements of a typical container and a general rule is that cargo that weighs over 20-25 tons and go beyond 12 meters in length, 2.5 meters in both width and height can be determined as out of gauge. Out of gauge cargo might also include heavy lift cargo. (Rushton et al. 2017, 620)

3.2 Risks and risk management

In this chapter the risks and risk management in supply chains are examined. The information in this chapter is based on the book *Supply Chain Risk Management, Vulnerability and resilience in logistics* 2nd edition written by Donald Waters (2011). The book deals with risks and risk management through the whole supply chain and in order to understand this chapter, the concepts used in this chapter will be explained in more detail in the next paragraphs. Knowledge about the risks and risk management is essential in order to fulfill the objective of this thesis, which is to identify the risks and challenges involved in the heavy lift transportation from Finland to Norway.

The supply chain concept can be explained and defined in several ways. According to Waters (2011, 36) the concept can be explained as “*series of activities and organizations that materials move through on their journey from initial suppliers to final customers*” (Waters 2011, 36). A major part of this thesis includes information about logistics and distribution, which are a part of the supply chain and the concepts of logistics and distribution are discussed and explained in Chapter 3.3 Distribution and logistics.

Risk can be defined in several ways depending on the context. Risks can appear in different forms and in any point of the supply chain, risks can cause a wide range of different consequences that can be linked to each other. According to Waters (2011) risk could be explained as “*anything that can affect or disrupt the movement of stuff and affects the planned motion of materials*” (Waters 2011, 1-14).

Risk in supply chains can be divided into two kinds of risk: internal and external risk. Internal risks take shape in normal operations and external risks appear outside the supply chain. Examples on internal risk is late delivery, human mistakes, errors in IT-systems and financial risks. A few examples on external risk is natural disasters, wars, outburst of diseases, disagreements with partners and lack of raw materials. There is no clear line between these two kinds of risks, and there are several ways to look at risks (Waters 2011, 1-14, 99-100), which will be discussed later on in this thesis.

Risk management is essential for organizations because of several reasons, but one of them is to avoid responding to risks too quick or in the wrong way, noticing risks too late or simply not trying to prevent risks from happening and just let them happen and then find a solution. Risk management makes it possible to prevent and avoid a risk, but it can also minimize the damage of the risks (Waters 2011, 76).

According to Waters (2011, 76), risk management can be described as “*the process for systematically identifying, analyzing and responding to risks through an organization*” (Waters 2011, 76).

Since one of the key topics in this study is logistics, which is a major part of the supply chain, it is necessary to define what supply chain risk management is. Risk to a supply chain is anything that could interfere with the movement of materials in the supply chain and according to Waters (2011) supply chain risk management “*is the process of systematically identifying, analyzing and dealing with risks to supply chains*” (Waters 2011, 76). Which is very similar to the definition of risk management, mentioned earlier. In the following chapters the different types and categories of risks, steps in risk management and the tools used for risk management are examined in more detail.

3.2.1 Types of risk

In the previous chapter it was mentioned that risk can appear in different forms. There are several types of risk and they can be categorized in several different ways. One alternative is to sort the risks in a supply chain into four groups: *physical risk, financial risk, information risk and organizational risk* (Waters 2011, 100-101). The types and groups of risks are examined in more detail below.

Physical risk

Risks that are related to the motion and warehousing of materials are called *physical risks*. Risks that for instance are related to transport, storage and delivery are risks included in this category. Some examples on risks are delayed deliveries, cancelled or delayed transport, accidents, harmed or missing goods and being out of stock. (Waters 2011, 101)

Financial risk

Risks that are related to the motion of money are called *financial risks*. These kinds of risks include for instance payment risks, bills or/and charges and investments. These risks can occur among other things as bad returns on investments, shortage of money, being in debt and extra expenses. (Waters 2011, 101)

Information risk

Risks that are related to the systems and motions of information are called *information risks*. These kinds of risks include the movement and collection of data, faults in systems, data processing and business intelligence. These risks pop-up as lost data, mistaken information, violation of data security, faults in transactions and errors in information systems. (Waters 2011, 101)

Organizational and industry risk

Risks that occur from the connections between different parties in the supply chain are called *organizational risks*. These kinds of risks occur in the relationships between different parties in the supply chain such as customer and suppliers. Examples on such risks are miscommunication or disagreements between parties, difficulties with suppliers, lawsuits or other legal action and suffer the loss of customers (Waters 2011, 101). An organizational risk affects the individual organization and its supply chain, while an industry-wide risk disturbs all organizations that are in the same industry. This means that if among other things fuel prices rise, all transport companies will suffer, not only one.

Waters (2011, 107-108) found that the difference between these risks are the response to the risk. If the risk affects the organization itself, it is recommended for the organization to work separate from other organizations and focus on their competitive advantages over their rivals. Meanwhile, when a risk affects the whole industry, it is recommended that all organizations work together, which makes it beneficial for everyone in the industry. (Waters 2011, 107-108)

3.2.2 Steps in risk management

The general goal of supply chain risk management is to make sure that the supply chain operations works without interruptions and has a trouble-free movement of materials from raw material to end customer. Despite this, there are several direct goals that supports the general goal of supply chain management, including establishing a supply chain risk strategy, point out the best way to preform risk management in the supply chain and use this to identify, examine and respond to risks that affect the supply chain, etc. The goal of risk management is not to remove the possible risks, it is to make everyone aware of the risk and then try to manage the risks. (Waters 2011, 88)

As mentioned earlier there are several direct goals to the general goal of SCRM (Supply Chain Risk Management) and depending on these goals it gives different benefits. When risks occur, there can be a tendency of acting in shock which can result in poor decisions, these kinds of things can be prevented by having an established SCRM. By having an established SCRM this is followed by several benefits, which include among other things that risks are discovered in an early stage or identified before they occur, the responsibility of risk is given to people with the skills and knowledge to handle them, responses to risk can be planned in advance, etc. There are many benefits with having a proper SCRM and the one's mentioned above where just a few of them. (Waters 2011, 89)

When the goals and benefits of SCRM are known, there is a need to plan how these factors are going to be accomplished. According to Waters (2011) there are three core elements of SCRM which include identifying, analyzing and planning responses to the risks to a supply chain. These steps will be discussed further in the chapter 3.2.3 Identifying risk, 3.2.4 Analyzing risk and 3.2.5 Reply to risk. Before these core activities there is preparation for these steps and after there is control and tracking of these activities, since risks changes over time and the responses to risk need to be observed so that they can be adjusted accordingly. In between the main steps of SCRM there is several more detailed steps in between (Waters 2011, 92-93). In the picture below the main steps in SCRM is illustrated.

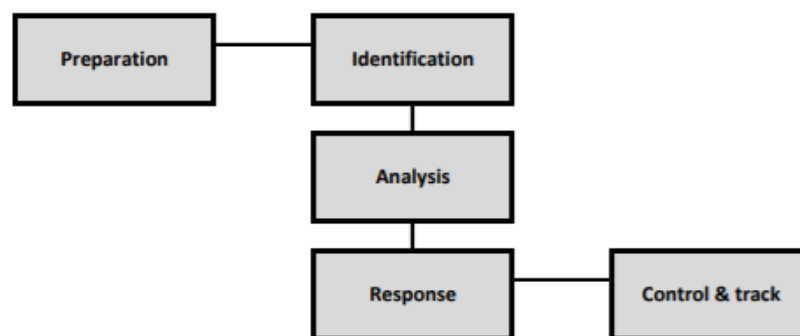


Figure 2. Main steps in supply chain risk management (Waters 2011, 92)

Unfortunately, it is not as easy to apply these steps as it seems. It can be very difficult to for example identify risk, determine the probability of them and estimating the value of the consequences when a risk occurs. Therefore, this method gives a framework for SCRM, and it is not meant to be a finalized technique for SCRM. (Waters 2011, 92-93)

It is hard to outline any detailed procedures for SCRM, but there are a few general procedures which include taking a forehanded approach to risk management, looking for constant improvement in the risk management operations, have a steady operative effectiveness and risk and being able to adapt and response to changes quickly to reduce risk. (Waters 2011, 95-98)

In the following chapters the main steps in SCRM are discussed further. These steps include identifying, analyzing and responding to risk. In addition, the chapters include information about the tools used to identify, analyze and respond to risk.

3.2.3 Identifying risk

It would be impossible to identify every risk possible, but it is possible to identify the most remarkable ones. Identifying risks is a crucial task needed to be done for the managing of risks (Waters, 2011). There are a variety of tools used to identify risks in each operation of the supply chain. All tools work in different ways and information is gained by different measures, some tools gather opinions, some analyze current operations and other former happenings. Which tool is the most suitable depends on the situation (Waters 2011, 110). In this chapter different tools of risk identification are examined. Risks can be identified through personal knowledge, by analyzing former events, by gathering opinions and by analyzing the supply chain operations.

Personal knowledge

Risk can be identified by asking around in the organization about the personal knowledge of people, that can provide deep knowledge about the organization and its surroundings and functions. Despite that, personal knowledge is not always reliable and that is why using other tools for the identification of risks is rather important. Personal knowledge might be unreliable since identifying risks require people recognizing the most remarkable risks, not only the most noticeable risks. Another example is that some managers are unwilling to reveal any risks that they might be responsible for because it could be a sign of weakness, some managers also are automatically focused on risks that they are accountable for, such as being out of stock, instead of focusing on the more remarkable risks that they are not responsible for, such as terrorism. (Waters 2011, 108-109)

When trying to identify risks in a supply chain, the general strategy is to divide the supply chain into sets of specific operations that is examined separately and based on that the risk is determined in each operation. The risk identification starts with determination of the whole supply chain operation and then dividing the whole chain into separate operations. This is followed by detailed examination of each part and discovering the main characteristics of each operation and the risks associated with that specific operation. Lastly all the most remarkable risks should be listed into a register. (Waters 2011, 109-110)

Analyzing former events

The *five whys* method is one of the tools used to analyze former events that happened in the past. Using the 'five whys' method you basically ask questions about the cause of a former event trying to identify possible future risks, the advantage of this method is that it examines risks that have happened and reveals the connection between the feature and cause of risk. This method simply advocates that important information can be gathered by asking five questions. (Waters 2011, 111)

According to Waters (2011, 111-112) by using *cause-and-effect diagrams*, also called fish bone diagram or Ishikawa diagram, the connection between a happening and their causes can be identified. In the fishbone diagram all the possible causes for an event is listed to draw a conclusion why a risky event was caused. In the figure below a fishbone diagram is illustrated with reasons why late delivery could be caused. The fishbone diagram illustrates four reasons for why the truck could have broke down and caused late delivery.

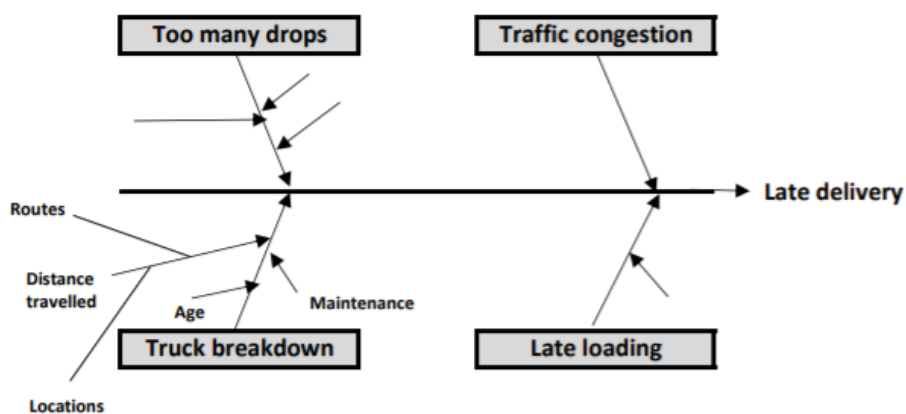


Figure 3. Illustration of a fishbone diagram (Waters 2011, 112)

Gathering opinions

Interviews is a tool used to gather information about future risks. By interviewing people with the right expertise and knowledge this method could give very detailed information about certain risks, other advantages with this method is that it is simple and quick to organize. However, as already mentioned in the chapter about identifying risks through personal knowledge is not always reliable, which is one disadvantage with this method. (Waters 2011, 115-116)

If the opinion of one person is unreliable, it might be a good idea to arrange *group meetings* to discuss remarkable risks together with other professionals. These meetings can be structured as formal or informal. There is some criticism against the formal structure of group meetings, since some may feel suffocated in these kinds of situations and formal groups have shown a tendency of coming to traditional and uncreative conclusions. To avoid these kinds of issues with formal meetings it could be a good idea to lessen the formality. One example of this would be to motivate the group to brainstorm, this way everyone in the group gets to participate and come up with inventive proposals. (Waters 2011, 116)

Personal opinions in a supply chain could also be gathered with the help of a survey sent to a group of professionals to ask about their personal perspective on risks. This method is called the *Delphi method* and is basically anonymous surveys sent to experts in the whole supply chain that are examined and sent back to the respondent as a summary. The summary is sent to all respondents in case they want to make any changes to their answers and this procedure will happen a few times back and forth until the group has an agreement. (Waters 2011, 116-117)

Analyzing operations

Analyzing and studying risks at every stage of the supply chain is easily done by using a *process chart* that divides the operations into sets of specific tasks. To give an example, one activity could be to move goods from a truck into a warehouse. This activity could be divided into several elements, such as unloading, moving the goods, inspecting the goods, taking off the packing material, etc. By putting the stages of this process into a process chart, it can be easier to analyze and identify any possible risks. There are several formats of flow charts. (Waters 2011, 118-119)

Despite great operations, there still might be some variations in the supply chain performance due to a wide range of different reasons, such as weather, employees, materials, etc. *Process control* chart is one of the easiest ways to observe this kind of variations. The structure of a process control chart usually shows the goal performance and two limits, one for small risk and another for growing risk. If the differences in the performance stays in the middle of these limits, it means that the process is controlled. (Waters 2011, 119)

Problems with risk identification

An organization can meet a lot of risks. One problem with risk identification in organizations is that not everyone is eager about it. Identifying risks can be seen in lots of different ways depending on your position in the company. The problem is that reporting risk might be seen as incompetence, failure or poor skills which will make people deny the risks and that they are present. Another problem with risk identification is that people who identify risks is usually given the duty to handle the risk after spotting it. This might cause problems since not everyone is competent enough to handle that kind of situations. (Waters 2011, 122-123)

Usually each representatives of a supply chain have a hard time admitting their own risks, because they are scared for some reason. Depending on the person noticing the risks, it might be seen differently, and the level of seriousness might differ depending on the person. Despite this, the risks shouldn't be ignored because they might be passed on to more incompetent people instead. (Waters 2011, 123)

Possibly the most remarkable problem of them all is the problem with unknown risk. Despite planning and analyzing there will be unforeseen events that can't be known in advance. For example, it is impossible to identify an earthquake before it occurs. Many of the unknown risks is time dependent, many risks occur after a while and appear over time, risks such as socio-political risks, economical changes and geopolitical changes that could lead to risks. Therefore, examining the business environment is especially important for risk management to be able to notice changes in time. (Waters 2011, 123)

Risk identification is a complicated process and it is hard to identify every existing risk including the unknown one's, which is why it isn't a specific science. To make risk identification possible you should focus on the most remarkable risks, analyze every stage of the supply chain with the help of the tools mentioned in the past chapters and form a risk

register with the most remarkable risks (Waters 2011). This is followed by the analyzing of risk, which will be addressed in the next chapter.

3.2.4 Analyzing risk

The goal of risk analysis is to make a list where all the risks are ranked and recognize the most remarkable risks and the less remarkable risks (Waters 2011, 131). There are two methods to analyze risk, a *quantitative method* and a *qualitative method*. The qualitative method which basically is about taking the risks identified and analyzing them by describing some of the characteristics, such as features of the risk, consequences, probability, impacted area, who has the responsibility, impacted people, goal of risk management, etc. This method good information but it doesn't provide any numeral results, which can be added by analyzing the risk in a quantitative method. (Waters 2011, 129)

The second method used when analyzing risk is the quantitative method, which has several types and are formed on two factors: probability of a risk happening and the consequences when the risk does happen. These factors are used to make it possible to evaluate the expected value and then classify the risks. The expected value of a happening is calculated by using the formula (1) below:

$$\text{probability} \times \text{consequence} = \text{expected value} \quad (1)$$

This calculation doesn't give the value of a risk for every time it happens, it gives the average result when one risk has happened many times. This works for most risks, but there are many risks that are hard to calculate the expected value for, before the risk happen. For example, it can be hard to calculate the damage of a fire before it occurs, because a fire is incident specific. The value could be rather high or very low and depending on this there will also be costs for the lost sales, etc. which will also add to the expected value. (Waters 2011, 130)

The most sensible way to use the expected value would be to classify the risk from the ones with the lowest impact to the ones with the highest. But this would not give confirmed values that could occur. The two factors that the quantitative approach is based on: probability and consequence, some also add a third factor to acknowledge the faults in risk management. Such as considering the likelihood of managers identifying a risk and handling it in time before it happens. (Waters 2011, 131)

The first step when using a quantitative approach for analyzing risky happenings is to determine the probability of a risk happening. The probability can have a value between 0 and 1, which means that 0 is a risk that is rare and most probably won't happen that won't require a lot of attention and a risk that is valued as 1 or close to it, is a repeated risk that should be considered in the normal work of a manager. Even if some risky happenings are valued as 0 this doesn't mean that the risk would never happen, because it could, but it is highly unlikely. Despite this, it could be useful to view this kind of risk in a way that if they would occur, what could be done to prevent major damages. There are many ranges of probability, that can be classified from impossible to certain and each has their value from 0 to 1. (Waters 2011, 131-132, 134)

There are three approaches to how to find out the probability of a risky happening. In the first method is the most reliable one and you use the expertise of a situation to get a theoretical calculation of probability, the second one uses actual data about past happenings to give an empirical probability. The third approach is the least reliable one, since this approach is dependent on people's views and opinions, which generally isn't suggested way to analyze. This approach is usually useful when analyzing difficult events, because it can give enough information about an event to help with resolutions. The two first approaches are objective, however this can be confusing, since there is objective risk that is exact and objective risk that is perceived. Which one it is, depends on peoples understanding of the risk. Therefore, a risk is never seen as objective, because there will always be a subjective view added because of human understanding. (Waters 2011, 132-133)

The second step of analyzing a risk, is to determine the value of the consequence when the risk happens. The consequences of risk are not always simple because sometimes the consequence cannot be calculated with the help of past data, probability or in financial terms. (Waters 2011, 135-136)

There are many categories of consequence, everything between insignificant and catastrophic. Instead of using exact estimates of value, ranges of values are recommended when classifying the consequences. Example of a range of value could be 10 000-20 000 €. This method is used to put the consequences of each risk into a prioritized order and the exact values isn't the most important. The ranges describe the level of consequence, for example a consequence categorized as catastrophic is described as an event that created absolute and unrepairable collapse of the supply chain and maybe of the whole organization. (Waters 2011, 136-137)

When you have approximated likelihood of a risk and the consequences, these can practically be added together, and you get a predicted value. In summary risk analysis includes making a risk register with every identified risk, determine the forecasted value for every risk and then categorizing these risk after the consequences of each risk in order to identify the risks that are the most significant and need the most observation. There are many ways of describing categories of risk, such as a risk map (or probability-impact matrix) and ABC-analysis (Waters 2011, 137, 142).

When the risks are put into categories and an estimated value is known, it is important to remember that the values are not exact, but they give managers an estimated value to work with in case a risk happens. They won't give exact information, but they will usually give managers useful information, of course it depends on the case, such as knowledge of the most remarkable risks to be able to prepare and observe them (Waters 2011, 140-141). In practice much more factors can be considered when making decisions about risk analysis and risk analysis is more demanding than it seems in the beginning (Waters 2011, 144). In the following chapters tools used for risk analysis will be examined.

FMEA

FMEA also known as *Failure modes and effects analysis* that is a risk analysis tool that examines the activities in a supply chain and based on this it figures out every way that the tasks could fail. When it has found the failures for each action, the following things for the risk are examined and rated from 1-10: probability, consequences and what is the probability that preventive actions can be taken before the failure gets serious. These factors are also given a 'priority number' that gives managers information about what failures they should prevent. (Waters 2011, 145)

Analyzing scenarios

Risks can also be analyzed by scenario analysis, which basically means that there is a group of people which a combination of different expertise that together predicts future conditions by setting up a line of decisions and come up with future situation that could be caused by these decisions. This tool is mostly focused on problems that are bigger and more long-term. By using scenario analysis, it can give you an understanding of future events and explain key features with future situations. (Waters 2011, 145)

Simulation

Simulation is a way of analyzing distinct operations without interrupting the real operations. It is a quantitative analysis of situations that might take place and it uses a lively illustration of a situation with the help of a computer that shows real life operations during a period. The computer simulates 'typical results' of one operation and based on this it can analyze things such as achievement and changes. This tool is rather long drawn but it can give a lot of useful information. (Waters 2011, 145)

Network models

The supply chain is often identified as a network with connections between different sections. The whole network is connected, and if a certain section of the supply chain experiences disruptions it will limit the remaining network. The main point with network models is that each section and connection in a supply chain has a certain capacity and it takes time to pass. This determines the capacity of the entire supply chain and network models analyses which parts of the supply chain is crucial for the movement of materials and identifies the bottlenecks in these parts (Waters 2011, 145). After the analysis of risk is done, this is followed by deciding the most suitable response to each risk.

3.2.5 Reply to risk

There is a huge amount of different risks and significance of risk which imply that there is a diverse amount of different responses to risk dependent on the significance of the risk. The goal of risk response is to decide the most suitable response for each risk and then determine the action needed to achieve the response (Waters 2011, 151-159). As mentioned, there are many ways to response to risk, these include:

- accepting the risk
- minimize the probability or the consequences of risk
- deflect, pass on or share the risk
- adapt to the risk
- make plans for the possibility that a risk happens, that comes into effect after a risk has occurred
- resist the change and try to prevent it from happening
- move to another market or industry to prevent the risk

Choosing the best response for a risk is not always simple, the best option is most likely the one that keeps material flowing for the lowest price. There are three stages to choosing a response. These include making list of every possible reply, examine the responses and make a shorter list of the most sensible responses and lastly choose the best response. There are several tools that can help you decide the right response. (Waters 2011, 151-159)

3.3 Distribution and logistics

In this chapter the concepts of distribution and logistics are examined in order to know the difference and the relationship between these concepts. Logistics and distribution become relevant for this thesis, because transport is a part of logistics and distribution, and some important aspects related to this needs to be included in this thesis, in order to understand the results of this research.

Rushton, Croucher and Baker (2017, 4) found that there are many definitions and names for the concept of distribution, logistics and the supply chain. In addition, Rushton et al. (2017, 4) found that there is no definitive definition for the logistics concept since it differs depending on many factors, such as industry, product and company. Therefore, logistics needs to be flexible and change depending on the environment. One of the key relationships of the logistics concept can be described as a result of materials management (flows of material) and distribution. Despite the fact that the logistics concept has many definitions and names there is one definition that is considered as the most suitable for many of the industries, and logistics is described as “*the efficient transfer of goods from the source of supply through the place of manufacture to the point of consumption in a cost-effective way while providing an acceptable service to the customer*” (Rushton et al. 2017, 6).

There is one concept that has an objective to deal with logistics and distribution as a united system, it is called the total logistics concept (TLC). Understanding this concept is important when planning for logistics, that will be examined later in this thesis. It has come to realization that the relationships between different factors of distribution and logistics should be considered in the environment of the broader supply chain. Instead of focusing on only one element in logistics, the elements should be examined in context with each other in order to understand the relationships between them. Understanding this concept is also important when making any potential cost compromises, such as reduction of packing materials or material stocks. These cost compromises should be examined in context with the other

elements in order to make positive cost compromises, not negative. (Rushton et al. 2017, 17-19)

The concept of distribution is represented as the way that products reach the market (Rushton et al. 2017, 57), namely the storage and motion of products from the final manufacturing location to the end user or customer (Rushton et al. 2017, 4). The main areas and the detailed features in each function that distribution and logistics usually cover in organizations are: transportation (mode, route & load planning, etc.), inventory (what, where and how much to stock), packing (unit loads, packing material, etc.), storage (location, type, how many and which size, etc.) and information (design, control of operations). Each of these functions need to be organized in a well-ordered way to have well working operations (Rushton et al. 2017, 6). As mentioned in the beginning of this chapter, transport is the transfer of goods and results as a part of both logistics and distribution. (Rushton et al. 2017)

In general, the supply chain covers a broader area of the business environment than logistics, and the supply chain represents the suppliers (raw materials, purchased parts, packing material and other components), logistics (production, packing, inventory for finished goods, transportation) and customers (end-users). This illustrates that the suppliers and the end users are included into the supply chain, while they are not included in logistics, which set them apart from each other and shows the relationship between them. (Rushton et al. 2017, 4-5).

3.3.1 Channels of distribution

Distribution channel basically means the way that product gets to the market. A physical distribution channel means the way a product is transferred to the final customer from the final production location. The final production location for a product really depends on what kind of product it is and who the customers are. The final point for customer products could be a store, or the product could be directly transferred to the customers house. Industrial products, such as the one's manufactured at the commission company, are most likely to be transferred from the manufacturer (commission company) to another factory or business. (Rushton et al. 2017, 57-61)

There are many types of physical distribution channels, from manufacturer to retailer and direct delivery from manufacturer to customer (Rushton et al. 2017, 58). These distribution channels have very different structures, which very much depends on factors such as types and number of intermediaries (Rushton et al. 2017, 61). Intermediaries are companies that handles a product before it gets to the end customer, for example a warehouse of some kind

or a broker. In the figure below different alternatives for so called manufacturer to retailer distribution is illustrated.

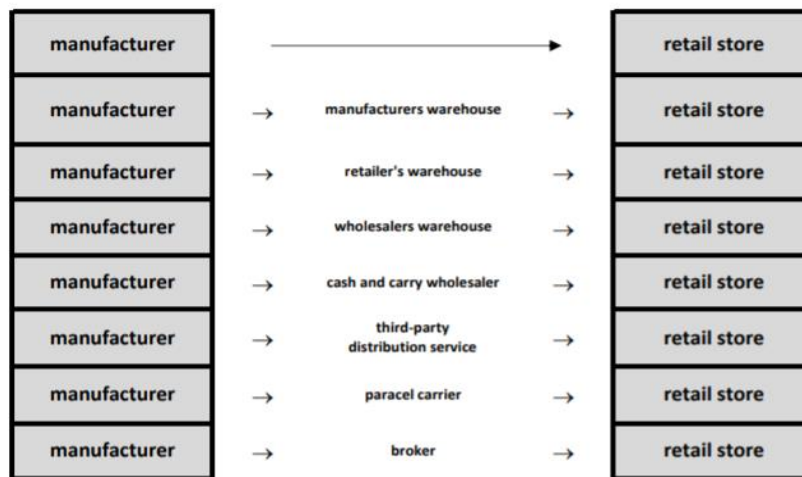


Figure 4. Distribution channels from production to retail stores (Rushton et al. 2017, 58)

There are also distribution channels that delivers the product directly to the customer without delivering it to a retail store. These alternatives are mail order, factory-to-home, home delivery and business-to-business. The first three alternatives usually refer to business to consumer (B2C) operations. The commission company is a so called, business-to-business (B2B) company that manufactures industrial products. Industrial products, despite the type of product, are usually distributed by the company itself or if the distribution will be outsourced to a third party, that does the distribution on behalf of the company. (Rushton et al. 2017, 58-61)

Choosing the distribution channel

There are a few factors that need to be considered when making a channel selection and designing the structure of a company's distribution channel. These factors include the channel objectives, channel characteristics and company resources. Apart from these things the financial situation and resources of a company has an influence on the channel structure and the possibility to have own distribution operations or outsourcing the operations to a third-party logistics service (3PL). (Rushton et al. 2017, 62-66)

According to Rushton et al. (2017, 62-63) the channel objectives are different from one company to another, but there are a few main points that should be thought of to ensure that the most suitable channel structure is established. The first main point is to make sure that the product is represented to the right marketplace and that the right distribution channels are used to reach the target. Second point is to improve the likelihood of sales, this could mean making the product visible in a retail store or advertising the product in a special way. Third point is to gain cooperation with other parties (both customers and suppliers) about things linked to the distribution, this can apply to things such as delivery time, vehicle, unit loads, etc. Fourth point is to give the kind of service as stated, this applies both for suppliers and customers because it will affect their decisions. Fifth point is to reduce costs and estimate the cost in relation to the product and service needed. The last point implies the importance of sharing information with suppliers to achieve an effective distribution. (Rushton et al. 2017, 64-65)

The channel characteristics that are examined include market, product and competitive characteristics. Depending on different market factors a distribution channel can be either short or long, these factors include the market size and extent. A short channel illustrates a distribution from manufacturer to a buyer's warehouse while a long passes several warehouses until it reaches the retail store. Depending on the product either a long or a short distribution channel will be the most suitable. Product characteristics such as the value, complexity, demand of a new product, time-sensitivity and other product requirements (hazardous products, frozen food, etc.) will also put limitations on the channel structure. (Rushton et al. 2017, 64-65)

According to Rushton et al. (2017, 65) the competitive characteristics or competitive advantages of a product needs to be considered when planning the channel structure. Giving an example, if a product is very similar to others it might be an advantage to provide better service than the competitors, to have a competitive advantage over other players on the market. (Rushton et al. 2017, 65)

Outsourcing distribution channels

The choice of having your own distribution operations or outsourcing them to a third party is a choice that needs to be decided. Third parties are used for example when industrial products are distributed, in case the company itself is not handling the distribution. If the decision is to outsource the distribution channels there is several things that need to be

thought of, which include how many channels to outsource and to whom. The use of third-party logistics (3PL) services has grown in many parts of the world and according to Rushton et al. (2017, 68) nearly 50 per cent of logistics in Germany and the United Kingdom is outsourced.

The most outsourced logistics services include transportation, warehousing, freight forwarding, customs clearance, reverse logistics, cross-docking, packing, labelling and assembly. The less outsourced logistics services include inventory management, IT-services and customer service. (Rushton et al. 2017, 66-69)

There have been some issues communicated by the users in the past with third parties that have not provided the services that was hoped for which resulted in things such as higher costs than expected and poor service. According to Rushton et al. (2017, 69) this took a turn after the Capgemini study made in 2012, when the users of third party services felt that the relations were positive and increased the performance of their logistics. (Rushton et al. 2017, 69)

3.3.2 Preparing for logistics

Rushton et al. (2017, 101-09) found that there are some factors that need to be considered when planning for logistics. A logistics system might be under influence of a lot of pressures, such as environmental pressures, competitive pressures, customer requirements, changes to regulations, evolving technology, etc. All these changes and pressures requires a logistics system to restructure and evolve. However, the changes done should not be focused only on the logistics system, but on the company strategic plans in a whole. (Rushton et al. 2017, 101-103)

Framework for a logistics plan

When a company has a clear corporate and competitive strategy the logistics strategy can be outlined based on these two strategies. Before this the company needs to recognize what the actual corporate strategy should look like, and needs to gain insight into the external and internal environment of the company. Additionally, a company needs to in detail define what business they are in, since it influences the business structure and need to be considered in order to decide the most suitable way to get the product to the customer. (Rushton et al. 2017, 103-107)

One approach to examine the external environment of a company is by implementing PESTEL analysis. PESTEL examines the political, environmental, socio-cultural, technological, economic and legal factors that externally influences a company. By implementing a SWOT analysis, a company can examine the internal factors affecting the company. SWOT analysis examines the strengths, weaknesses, opportunities and threats in a company which is needed in order to realize both advantages and disadvantages with the current operations. (Rushton et al. 2017, 103-105)

When the corporate strategy is clear, a company should determine the competitive strategy that has a significant role in the planning of a logistics strategy. The competitive strategy is determined for a company to realize their advantages over their competitors, these advantages can vary between cost and service advantages. (Rushton et al. 2017, 103-105)

When developing a logistics plan it is necessary and important to remember that the logistics should be connected to the corporate plan and should not be planned separately. The coverage of the plan should also be determined, in order to know how much of the operations in the supply chain the logistics plan should cover. There are a few key factors that needs to be considered in planning a logistics strategy, these include logistics process design, network design, information system and organizational structure. All these factors need to be planned in connection with the other functions in the supply chain, to be able to consider how they affect each other. (Rushton et al. 2017, 106-107)

The process design ensures that the functions in a company are consistent and aim to gain the whole supply chain, not the separate function. The network design applies to the standard elements in logistics, including factors that is connected to the material flow (manufacturing, inventory, storage, etc.). Information system design applies to the information that supports the operations and structure in a company, while the organizational structure refers to the overall structure in the company, issues with the structure includes the problem with working in isolation from other functions in the company, which can lead to significant problems. (Rushton et al. 2017, 108-109)

Additionally, the product features, such as the type of product, product life cycle, packing and unit loads need to be considered when planning for logistics (Rushton et al. 2017, 109). These factors will be examined in detail in the next chapter.

Product

The product features often have an important effect on both the structure and cost of the distribution system. The main categories that are important for the planning of a logistics strategy are value to weight ratio, volume to weight ratio, high-risk products and substitutability. (Rushton et al. 2017, 109)

Value to weight ratio basically means that if the product has high costs or low costs in comparison with the weight of the products the costs of transport, storage and inventory will differ. If the product has a high value it is more acceptable to have higher transport costs and use a more expensive mode of transport, while if the product has low value the distribution takes a large part of the total cost and a more inexpensive way of transport is preferred. Volume to weight ratio refers to the volume in cubic meters that a product takes in comparison with the weight of the product. Basically, the costs of storage and transport tends to increase when the products have a high volume to weight ratio, while they decrease the other way around. (Rushton et al. 2017, 109-110)

Another important feature to consider is if the product is a product of high-risk, this refers to the risk linked to the distribution of a product. If a product is of high-risk this might require special demands on the distribution system. A high-risk goods include dangerous goods, fragile goods and goods with great value. For example, if the goods are fragile, they might require exceptional packaging to avoid damage during handling or transport. (Rushton et al. 2017, 111-112)

Another product features that need to be considered are the level of which it can be replaced. Depending on the degree of substitutability the distribution system needs to be designed in a way that avoids customers choosing a substitute product. This can be dealt with by having fast transport or high stocks, which both have high costs. (Rushton et al. 2017, 111)

Product life cycle

The product life cycle (PLC) is divided into four stages: introduction, growth, maturity and decline. Each of these stages shows the developing life cycle of a product and every stage in the life cycle requires different attention and that is why it is important to be able to study and respond to these developments during the products life cycle. (Rushton et al. 2017, 112-113)

Packing

The package is one of the products physical features that needs to be considered in the logistics functions. The packaging is a part of the TLC and interferes with other functions in the organization and has a connection to the total logistics costs. The packaging of a product is primarily made for the protection of a product, but it is also essential for the storage and handling of the product. The packaging should also fulfil the requirements of the product and the most suitable packaging should be used to protect the products. (Rushton et al. 2017, 113-114)

Unit loads

Unit loads basically means goods that are grouped together on for instance, a wooden pallet or in a large container in order to be handled and moved together in a more efficient way with the help of automated equipment. By grouping goods or packages into right unit loads it makes the distribution and logistics more effective by simply reducing the costs, movement and time consumption by not handling several small goods manually. (Rushton et al. 2017, 114)

3.3.3 Warehousing

Warehouses are one of the key components of today's supply chains, there is a wide range of classifications, functions and roles for warehouses. Warehouses are costly and should be successfully managed since they usually have a direct impact on customer service and expenses. Sometimes the Heavy lift goods are moved from the final production place, to a warehouse, in case the transport is scheduled way ahead in time which makes this chapter a relevant aspect in the logistics and distribution of Heavy lift. (Rushton et al. 2017, 291-300)

A warehouse can have several roles and usually a warehouse manages a combination of these roles. The roles include among other things functioning as an inventory keeping point, goods sorting point, cross-docking point, assembly place, place for returned goods, consolidation centre and trans-shipment point. Cross-docking means that goods arrive after being purchased and are immediately moved to another vehicle in order to carry out a customer order, without storing the goods. A consolidation centre is a place where goods from different product ranges are assembled, in order to deliver them together instead of separately. Trans-shipment basically means that goods are picked up and delivered to a

warehouse (trans-shipment point) where they are organized and transported further to the customers. (Rushton et al. 2017, 292-294)

Depending on what kind of role a warehouse has the warehouse functions will vary. Main warehouse functions include among other things receiving goods, organizing goods, packing or picking goods, storing goods, dispatching goods, etc. Except these functions a warehouse might also offer minor additional activities. As already mentioned, warehousing is costly, in fact it covers nearly 20-30 percent of the logistics expenses, which is dependent on the characteristics of the operations. The warehouse costs can generally be divided into staff, building, services needed for the property, equipment and IT. (Rushton et al. 2017, 294-298)

3.4 International logistics

There are many factors that need to be considered in international logistics. These factors include financial matters, economic unions and international trade agreements, mode of transport, documents, delivery terms and whether freight forwarders will be used in the operations. These aspects of international logistics are examined in this chapter. (Rushton et al. 2017, 438).

Economic unions and trade agreements

Economic unions and trade agreements are quite relevant for this thesis since the target country is Norway, that is a country outside of the EU, that might influence choices that evolves around the logistics and distribution of Heavy lift goods across borders. The European Union (EU), the Southeast Asian Nations (ASEAN) and the North American Free Trade Agreement (NAFTA) is a few examples on economic unions and trade agreements that has impacted global trade. (Rushton et al. 2017, 438-440)

Through these unions and agreements trade barriers worldwide has been reduced and for instance in the EU goods can be transported anywhere without the need of customs, the documentation is easier, and the movement of capital is free. Despite these aspects there is still areas where policies differ that affects the logistics and distribution. These aspects include among others different employment laws, environmental problems, fuel duty, etc. between some nations. (Rushton et al. 2017, 438-440)

Financial matters

There are some financial matters that should be considered in international transport in order to find the most profitable opportunities. These matters include the type of payment used, such as letter of credit, cash in advance, open account and a draft. Other matters to consider include any possible duties or taxes that could affect the cost, transport costs and any transport related costs such as additional fees or fuel costs. In addition, any costs for handling or storage of goods and goods insurance should also be considered. (Rushton et al. 2017, 440-441)

3.4.1 Modes of transport

The main modes of transport include road, sea, air and rail/intermodal transport, and all of them can be used in the movement of goods internationally. Road transport is the most popular mode of transport in several countries, especially in the EU. Even though road transport takes the place as the most used transport mode, rail transport is used in countries with a large geographical coverage and in countries where environmental regulations or other reasons makes it tough to transport by road. (Rushton et al. 2017, 424-426)

Deep-sea and air transport is used less than the two modes mentioned before, although in land waterway transport and pipelines is used in certain situations. Briefly explained, choosing the right transport mode is a significant part of the management of logistics & distribution, and there are a few factors that needs to be considered in the selection of international transport methods. These factors are operational factors, transport mode characteristics, consignment factors, and cost and customer service requirements. These factors are illustrated in the figure below. (Rushton et al. 2017, 424-426)

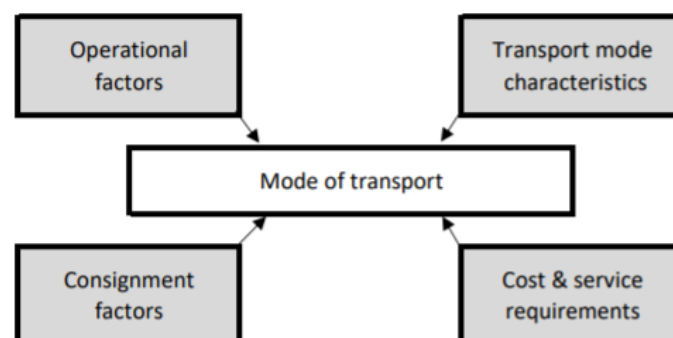


Figure 5. Selection process when choosing transport mode (Waters 2011, 426)

Rushton et al. (2017, 426-428) found that the *operational factors* (external environment, customer characteristics, product characteristics) that should be considered in the choice of transport mode are external factors such as infrastructure, trade barriers, export controls, legislation, duties, financial and economic conditions (inflation, exchange rates), communication possibilities, cultural differences and weather or climate conditions. Depending on the country the external factors will vary.

Other operational factors that can regulate the choice of transport mode is customer characteristics, and most of the following characteristics need to be considered both for international and domestic transport. These characteristics includes requirements or agreements on a service level such as agreements on certain delivery times (which requires a reliable transport mode to avoid failure to deliver), delivery place requirements (location, vehicle, equipment for unloading), credit capacity of the customer, terms of sale including incoterms (regulates the mode of transport), size of goods (depending on the size of the goods, different modes of transport are preferred), value of the customer (more important customers will receive the transport mode that they prefer) and information about the product (handing over information to a customer during delivery). These characteristics can affect the choice of transport mode in different ways and they all should be considered in the selection process. (Rushton et al. 2017, 428-429)

Further Rushton et al. (2017, 429-430) found that some product characteristics also should be considered in the selection process. These factors include the physical character of the product, such as the space that the goods take in cubic meters, weight and value of the product. If the products are categories as dangerous goods, this might affect the choice of transport mode. (Waters 2011, 429-430)

Rushton et al. (2017, 429-430) found that the characteristics of the transport modes should be considered as well in the selection process. This means that characteristics for the different transport modes (road, sea, air, rail and intermodal) should be considered in order to choose the most suitable mode of transport. These characteristics can concern things such as cost, availability, speed, reliability, handling systems, packing, delays, damage to goods, route, type of goods, security, insurance possibilities and documentation requirements. Each of these factors differ depending on the mode of transport, and by considering them for each transport mode, the right one will be selected. (Waters 2011, 431-436)

Consignment or order-related factors, such as special characteristics linked to the shipment, might have an impact on the transport mode. A few of these factors include the route, distance, type of cargo, load quantity, unit load, urgency or need of cargo and the value of the order. These factors will not always necessarily impact the mode of transport, but sometimes these need to be considered. (Waters 2011, 436-437)

The operational factors, characteristics of each transport mode and other special characteristics related to the shipment will also be examined in relation to cost and service requirements for the shipment. This could mean requirements such as the urgency of the order or costs related to the shipment. Depending on these requirements the most suitable transport mode will be selected. Basically, this means that a transport mode will be selected based on the size of the load and the distance to the destination. (Waters 2011, 437-438)

Road transport

Road transport is popular mainly because of its cost-effectiveness, flexibility and because it is available for nearly everyone. The challenges that road transport faces include among others the environmental challenges such as stricter requirements on exhaust emissions and noise emissions. Road transport can be divided into line-haul transport and delivery transport, line-haul transport is basically regularly scheduled transport between two places, and delivery transport is a so-called “door-to-door” delivery which pick-up and delivery place is set by the customer. In road transport a road waybill, also known as CMR, is required both for domestic and international transport and this is examined in more detail in Chapter 3.3.6 Documentation. The CMR acts as proof of receiving cargo or as evidence of the transport requirements agreed in advance. (Hörkkö et.al. 2010, 272-273)

In road transport the pick up is done during the agreed time and place, the sender is supposed to make sure that the driver is provided with the required documentation and make sure that the goods are properly packed. Moreover, the parties involved in the road transport should also agree on who is responsible for the loading, unloading and the lashing of cargo. Furthermore, there is one exception for the lashing of cargo, which includes the lashing of heavy cargo, this is when the sender is responsible for securing the cargo. When it is time to unload the cargo, the driver needs to make sure that the cargo can't be stolen. (Hörkkö et.al. 2010, 272-274)

Hörkkö et al. (2010, 274-275) found that the transport by road needs to be done according to the route agreed beforehand, and if the route has not been determined the driver can choose the most suitable route taking in account that the goods will not get damaged. The goods are handed over to the receiver mentioned on the CMR if nothing else is stated. (Hörkkö et al. 2010, 274-275)

As already mentioned in the beginning road transport is popular for its flexibility, which also is one of the advantages of using road transport. Road transport is also beneficial because of the possibility to transport quickly not only domestically but also across borders. Additionally, road transport has a wide range of transport equipment (vehicles) for different circumstances. The disadvantages of road transport include among other things the differences in weight and dimension regulations on vehicles from one nation to another, which can cause disruptions in transport especially of heavy cargo. Furthermore, it is usual that there is separately added cost during the transport, such as road taxes or other similar fees. (Hörkkö et al. 2010, 272-284)

Sea transport

Basically, there are three different forms of sea cargo carriers. These are categorized into liners (conference line & non-conference line) and tramps, the difference between these forms are the service. The liner carriers transport passengers and general cargo on the same routes at regular scheduled times, while tramp carriers transport mainly bulk cargo, has no firm routes or regular schedules. Moreover, the liner carriers sail on the same routes for the similar prices while tramps can sail from one place in the world to another for a compromised price (Reuvid & Sherlock 2011, 199-200). Tramp carriers transport mainly bulk cargo, and the definition of bulk cargo is cargo that will not fit into a container, such as heavyweight or cargo with too large dimensions (Rushton et al. 2017, 450).

Liner conferences are groups of shipping companies that sails on the same routes and gather all the companies from the same geographic area together (Rushton et al. 2017, 447). These conferences have in the past been criticized for being anti-competitive (Rushton et al. 2017, 447-448). Despite this, there is a third option called non-conference line, that operates on certain routes and compete with the conference liners (Reuvid & Sherlock 2011, 200)

The documents required for sea transport depends on various factors and the documentation required for international logistics will be examined in more detail in Chapter 3.4.2 Documentation. The major documents that are used in sea transport include the bill of lading,

certificate of origin, letters of credit, packing list and commercial invoice. The requirements depend mostly on the requirements of the destination country, product characteristics and the origin of goods. (Rushton et al. 2017, 455-456).

Air transport

There are three key elements that form the air transport industry, these elements are the airlines, IATA (International Air Transport Association) and the cargo agents. The IATA is a trade association that determine standards associated with the security, safety, training and unit load devices (shipping containers used in air transport) in the air transport industry. The association offers several other services as well. The cargo agents used in the air transport industry are certified by the IATA that makes sure that the standards are met. The cargo agents are freight forwards that handles the transport procedures on behalf of the customers. The airlines carry cargo and passengers, and they can be specialized in specific services. Some airlines might offer air cargo carriage while some offer carriage for heavyweight cargo. These are the three key elements that form the air transport industry. (Rushton et al. 2017, 469-470).

The documentation required in air transport include among other things the packing list, commercial invoice, certificate of origin and other documents depending on specific requirements. Apart from these documents, the air waybill and house air waybill are required. (Rushton et al. 2017, 476-477).

Rail transport and intermodal transport

Rushton et al. (2017, 504) found that rail transport is a relatively young mode of transport in the context of carrying goods compared to road transport. Railways require a firm foundation, with rails placed on supports. The railway needs to be free from disruptions, the train needs to move freely and anything that could slow down or interrupt the movement of the train should be adjusted in a way that the train can passage. Additionally, in order to move cargo or passengers by train and be able to get cargo and passengers to and from the train, train stations are required. (Rushton et al. 2017, 504)

Rushton et al. (2017, 509-510) found that the advantages of using rail transport includes the relatively high speed, the railway can carry more cargo than any other transport mode that carries goods by land, the rail transport is seen as less harmful for the environment than other modes of transport because rail transport is more energy efficient due to the usage of

electrical energy for traction to reduce the dependence on oil. Additionally, rail transport has been proven to be safe particularly in the carriage of dangerous goods. (Rushton et al. 2017, 509-510)

The disadvantages of using rail transport includes the fact that railways are sensitive for economic downturns, the railways experience hardship from the need of transporting goods from the train into other modes of transport and the railways are vulnerable to industrial action, such as disputes, and if these occur too often it will discourage customer to use rail transport. (Rushton et al. 2017, 509-510)

Intermodal transport can be defined as moving goods by several modes of transport in the same vehicle or unit load without handling them in the transition from one mode to another. Railways has a significant role in intermodal transport, but there are also intermodal vehicles that moves by water (including inland waterways) and roads. (Rushton et al. 2017, 485; 494-499)

3.4.2 Documentation

One of the most important aspect of international logistics is the documentation, that is needed for every mode of transportation. (Rushton et al. 2017, 608-609) However, the needed documentation can differ depending on several things, such as the origin, mode of transport and the requirements of each destination. Additionally, some documents are used for multiple purposes while others are used for one purpose. (Rushton et al. 2017, 612-613)

The documents discussed in this chapter are a few of the most typical documents that are essential in the most cases. These documents include packing list, commercial invoice, customs document, letters of credit, certificate of origin, bill of lading, air waybill, road waybill (CMR) and rail waybill (CRI). Other typical documents that aren't always required will be examined as additional documents. (Rushton et al. 2017, 612-613)

Transport documents

Bills of lading

The bill of lading is used as proof for what is delivered and in what condition, it is also used as a commitment to deliver the goods to the agreed destination. There are different types of bills of lading depending on the situation and it is issued by the shipping company (sea transport) (Rushton et al. 2017, 455). The bill of lading works as a document of title, which

means that this document can be used to prove the ownership of the goods (Reuvid & Sherlock 2011, 234) and the owner of goods, is the holder of the bill of lading (Rushton et al. 2017, 455).

Road waybill

The road waybill, also known as the CMR, that is an abbreviation for “*Convention des Marchandises par Route*” (Reuvid & Sherlock 2011, 233) and is a delivery or release note used for road transport that works as a receipt for the goods transported, however the waybill won’t prove the ownership of the goods, such as the bill of lading does. The goods will be released to the one entitled consignee on the road waybill. (Reuvid & Sherlock 2011, 232-233)

Rail waybill

The rail waybill, also known as CIM, that is an abbreviation for “*Convention Internationale Concernant le Transport des Marchandises par Chhemine de Fer*” (Reuvid & Sherlock 2011, 234) is a delivery or release note used for rail transport and works as a receipt for the goods transported, in the same way as the CMR. The CIM doesn’t prove the ownership of the goods alike to the CMR. (Reuvid & Sherlock 2011, 232-234)

Air waybill

The air waybill (AWB) is required for transport by air internationally and domestically, and it is issued by the airline company nominated for the transport. The document is a description of the goods transported together with the price for the service. In some cases, the AWB is also used in road transport, if most of the transport is done by air. (Rushton et al. 2017, 476)

House air waybill

The freight forwarder who will assure their responsibility as a transporter is the one who issues the house air waybill (HAWB). The HAWB is often used in circumstances where small cargo shipments have been combined by a freight forwarder for forward transport to the destination. In these kinds of situations, the separate HAWB is completed in a master air waybill (MAWB) that works as a contract between forwarder and airline. (Rushton et al. 2017, 476-477)

Customs document

Operates as an administrative document and the document is used at the customs authorities. Commonly it can be used in any countries both on the way into and out from a country. In the EU the customs document is also known as SAD which is short for single administrative document. (Rushton et al. 2017, 612)

Letters of credit

The letter of credit is used to protect both seller and buyer, it is a way to ensure that the seller gets their payment in full and the buyer receives the goods. The process is complicated, and the following description of the process is vague and described in general. The letter of credit (LC) is made by the issuing bank (buyers bank) on the behalf of the buyer in one country. The issuing bank entitles the seller as a beneficiary to the capital mentioned in the LC together with the requirements that need to be met by the seller. The LC is sent to the advising bank, also called seller's bank that is in another country. The letter of credit is not always required in international transport, but it is used in order to make the trade of goods for money smoother. (Rushton et al. 2017, 455)

Packing list

The packing list is a description of the goods that is transported, it usually includes information about the goods, such as the weight and measurements of the packages and the amount of goods in each package. The packing list is needed for customs procedures, when the goods are transported through customs. In sea transport is usual for the shipping company to want information about the goods, such as if the goods can be shipped open deck (unprotected from different weather conditions and risk of loss) or if the goods are stackable. (Rushton et al. 2017, 456)

Commercial invoice

This document is issued by the seller and includes information about the goods, such as the specification of the goods, together with the number of goods, measurements and value. The value of the goods is needed for customs, for them to be able to give an estimated custom duty tariff. (Rushton et al. 2017, 456)

Certificate of Origin

Rushton et al. (2017, 455) found that the Certificate of Origin is provided by the party that can confirm the origin of the products being transported. When the goods are transported to their destination, this document is usually needed by the customs because of things such as trade agreements and tariffs. (Rushton et al. 2017, 455)

Additional documents

Rushton et al. (2017, 609-611) found that in addition to the most typical documents, there is situations where additional documents are required. There are many reasons to why goods require additional documents during transport and a few of which are. (Rushton et al. 2017, 609-611):

- the country of destination and the relationship to the country of origin
- features of the goods
- the status of imported goods
- any requirements on quality or safety standards in the destination country, that might need additional documents.

Depending on the country of destination and that country's relationship to the country of the goods origin there might be a need of additional documents. This refers to the political relationship between countries, such as any political conflicts or prohibitions that would cause problems. Moreover, if the country of destination is in the same or different trading union as the country of the goods origin there might be different requirements on the number of documents. For example, goods transported in the EU are allowed free movement inside the borders of the EU and this requires a minimal number of documents. (Rushton et al. 2017, 609)

The characteristics or features of the goods might require additional documents. Cargo such as technology, aerospace and military equipment might require special documents or licenses. If dangerous goods are transported, they most likely need additional documents and some products might be illegal in some countries and needs to be acknowledged before they are sent off for transport. (Rushton et al. 2017, 609-610)

The status of imported goods might require additional documents. Goods can be imported permanently, but also temporary. Depending on the status of the import the goods might need additional documents. If goods are temporary imported to a country, it is usually a clear process. However, sometimes goods inside a country might move from one customs region to another, which in some cases requires a customs document for the movement internally in a country, which on the other hand requires that accurate documents are available. (Rushton et al. 2017, 610-611)

Some countries might require documents or markings of quality or safety standards, such as the CE marking. If the goods are CE marked it means that the goods are allowed free movement in the EU, meet the requirements of the EU regulations and fulfil the health, safety and environmental requirements in the EU. (Rushton et al. 2017, 611)

3.4.3 Incoterms ® 2020

Incoterms 2020 is a collection of the 11 most common delivery terms used in international trade published by the International Chamber of Commerce (ICC). These rules are described with three letters and are used in the sale and purchase contracts of goods in business-to-business operations. The trade terms are divided into any mode or modes of transport (EXW, FCA, CPT, CIP, DAP DPU, DDP) and sea and inland waterway transport (FAS, FOB, CFR, CIF). The Incoterms 2020 are illustrated in the Figure 6. (ICC 2019, 136-137)

The Incoterms rules describe the obligations between the seller and buyer (carriage, insurance, shipping documents, customs clearance etc.), when the risk is transferred from the seller to the buyer and who is responsible for which costs linked to the delivery (transport cost, packing cost, loading & unloading costs) (ICC 2019, 136-137). This is also the reason why the Incoterms become relevant for this thesis; all Heavy lift shipments are sold with certain delivery terms (Incoterms) that needs to be considered during transport. The previous version of the trade terms was Incoterms 2010 and there were a few changes done in the Incoterms 2020. One of the changes was that the delivery term DAT was changed into DPU. (ICC 2019, 150)

The rules are used for the contracts of sale and they are designed to indicate trade practices for any type of goods, this means that the rules are not designed for any certain type of product. The rules are not made to deal with things such as the transfer of the goods ownership, terms of payment, delivery time, consequences of delay or the law linked to the contract of sale. The incoterms are a part of the contract of sale, and the aspects mentioned above should be added into the contract of sale to avoid trouble further on and because the Incoterms won't provide or deal with these aspects. (ICC 2019, 136-137)

Incoterms 2020	
<i>Any mode or modes of transport</i>	
EXW	Ex Works
FCA	Free Carrier
CPT	Carriage Paid To
CIP	Carriage and Insurance Paid To
DAP	Delivery at Place
DPU	Delivery at Place Unloaded
DDP	Delivery Duty Paid
<i>Sea and inland waterway transport</i>	
FAS	Free Alongside Ship
FOB	Free On Board
CFR	Cost and Freight
CIF	Cost, Insurance and Freight

Figure 6. Incoterms 2020 (ICC 2019, 3)

3.4.4 Freight forwarders

It is very common to use freight forwarders in international logistics. Freight forwarders operate as middlemen or intermediaries between the shipper of goods and the carrier of the goods. The freight forwarder offers several services among which are advice, knowledge, documentation, customs clearance, booking transport and order collection of goods. (Rushton et al. 2017, 444)

The advantages of having a freight forwarder is taking part of their knowledge and expertise, contacts, facilities for different needs and simply the convenience of having a third party handling these aspects of the international logistics. Disadvantages of having a forwarder is simply the costs of a forwarder and the reduced control of the operations. (Reuvid & Sherlok 2011, 195-199)

3.4.5 Customs

Considering that the thesis is delimited to the transportation from Finland to Norway this chapter of this thesis will examine the customs procedures for export. Export refer to goods leaving the EU to a non-EU country. Before goods are exported an export declaration needs to be submitted. The export declaration is usually submitted electronically, by the exporter to the customs, so that the customs authorities can oversee any possible restrictions or forbidden goods, and gain information about anything that could affect the export procedures. The exporter needs to be someone who has the right to decide whether the goods are exported, and the exporter needs to be settled in the EU's customs territory. However, the exporter has the right to use representatives, such as forwarders, for submitting the export declaration. (Finnish Customs, 2020)

Usually goods are exported permanently, but it is also possible to export goods temporarily which means that the goods will return to the EU in the same condition as they were when exported. There are two forms of export, direct and indirect export. Direct export refers to the export procedure where goods exit Finland for a country outside the EU, while indirect export refers to the export procedure where the export begins in Finland, but the goods exit the EU in another country in the EU. (Finnish Customs, 2020)

Some goods are forbidden or limited in some extent from export, this concerns goods such as weapons or dual-use items (Finnish Customs, 2020). Dual-use means items that like products, technology or software that are used by military and civilians. This is controlled in the EU in order to keep the peace and security internationally (European Commission, 2018).

Considering that this thesis is delimited to transport to Norway, that is a non-EU country, it is necessary to include information about goods exiting the EU. When the goods exit the EU, they need to be in the same condition as when the export declaration was accepted. When goods exit Finland by sea, rail and air transport there is a few points to consider. (Finnish Customs, 2020)

When goods are exported by any of the modes mentioned above, an electronic arrival at point of exit notification need to be presented, additionally the transporter need to present an exit manifest presentation and an exit notification that confirms the exit of goods. In road transport the EAD (Export Accompanying Document) needs to be presented, that is provided when the export declaration is accepted by the customs. (Finnish Customs, 2020)

3.5 Norway

Norway is in the northern Europe, a country with a mountainous landscape and thousands of glacial fjords and islands on the coast. The climate in Norway varies between the Eastern and Western Norway. The winters are colder and the summers warmer in the Eastern Norway, and the other way around in the Western Norway. The official language in Norway is Norwegian (Bokmål and Nynorsk) and English is known by most of the Norwegians, that speaks it as a second language. (Christensen, 2020)

3.5.1 Transport by road in Norway

This thesis is delimited to the transport of Heavy lift from Finland to Norway, and there are some aspects that needs to be considered when driving in Norway with a heavy load by road (Statens vegvesen, 2020a). Some of the most relevant aspects are presented in this chapter.

Route selection

Norway is a country with significant variations in the quality of roads and the country has a difficult road network, this means that there are roads that are hilly and difficult to drive on during winters, especially with a heavy load or roads that are narrow that are difficult to drive on with wide shipments. This shows the importance of a well-planned route to avoid any accidents during transport. (Statens vegvesen, 2020a)

Weight and measurements

Norway has several regulations for the weight and measurements allowed in road transport, which should be considered in when driving by road in Norway. On public roads in Norway the maximum vehicle width is 2,55 meters and 2,6 meters for the vehicles that has a trailer. The maximum length is 19,5 meters for vehicles driving on public roads. These regulations might differ from one road to the other but generally these are used (Statens vegvesen, 2020a). In case modular vehicle combinations, also called road trains, are used in road transport, the length can not exceed 25,25 meters or 60 tons in weight. Modular vehicle combinations are basically a motor vehicle (truck) combined with a trailer or container (Statens vegvesen, 2020b).

The Norwegian Public Roads Administration (Statens vegvesen) has a few lists of the allowed weight, axle loads, and lengths allowed on several different roads in Norway for several different types of shipments, such as normal transport, special transport and modular

vehicle combinations. The lists are only available in Norwegian and can be found on the website of Statens vegvesen. Despite this there was explanations of the lists available in English. The lists show an overview of the allowed weight and measurements, and the roads that they apply to. There are bridges and roads in Norway that only tolerates a certain amount of weight, and because of this there are restrictions to weight and measurements in road transport. The road list for special transports are the ones that apply to Heavy lift transport, since these kinds of shipments differ from normal transport with their weigh and/or measurements. (Statens vegvesen, 2020c)

Nature and weather conditions

The weather conditions and road network in Norway puts some criteria on the vehicles used for transportation by road. The roads in Norway vary from hilly roads to tunnels to narrow and steep roads, which need to be considered when driving. Driving during winter in Norway is a challenge. The road conditions during winters in Norway are worse than during summer, and the roads might be slippery which requires an experienced driver. Therefore, it is important that the vehicles used are equipped with the needed equipment such as winter tyres, and that the drivers keep a close eye on the speed limits. This is especially important for heavy shipments, (such as Heavy lift) because these kinds of vehicles usually need to drive close to the edges of the road so that passing traffic can safely drive past the heavy vehicle. In case a vehicle weighs over 3500 kg, so called snow chains on the tyres are required when driving during difficult winter conditions. The chains are used when the roads are icy to make the road less slippery and maintain the contact between the road and the wheels. There is a lot more requirements for driving during in Norway due to the weather and nature, the ones mentioned are just a few of them. (Statens vegvesen, 2020a)

3.6 Summary of the theoretical framework

The theoretical framework in this study covers risks and risk management in supply chains and important aspects of logistics and distribution. Furthermore, concepts such as heavy lift are discussed, and necessary characteristics of international logistics are examined. The major parts of the theoretical framework are displayed in Figure 7 below.



Figure 7. Theoretical framework

The main risk that is studied in the empirical part is the physical risk, which involves risks in transportation such as delays, damage and accidents (Waters, 2011). Risk such as financial risk, information risk and operational risk were also included in the interviews in order to identify any possible risks with a connection or relationship to the physical risk.

The theory about risks, risk management and international logistics (modes of transport, incoterms, customs, documentation) that are covered in the theoretical framework are used as groundwork for the empirical framework of this study, when planning the qualitative interviews. The empirical part is executed by conducting qualitative interviews and the empirical framework applied in this thesis is examined in the following chapter.

4 EMPIRICAL FRAMEWORK

The empirical part of the thesis contains a qualitative research by executing qualitative interviews. This part of the thesis is completed in order to find out the risks and challenges that can occur during transport of Heavy lift from Finland to Norway. Additionally, the empirical part is executed with intention to strengthen the theoretical framework. Moreover, the validity and reliability of the study are determined.

4.1 Research methodology

In chapter 2 Methodology, qualitative and quantitative research methods were determined. It could be concluded that when using a quantitative research method, data is collected by using questionnaires, structured interviews and structured observations. While qualitative data is usually collected verbally, written or via observations in several different forms and without any specific structure. The result of quantitative research is usually numerical while quantitative data is non-numerical. (Saunders et al. 2019, 175-180)

This research was executed by using a qualitative research method and obtaining data through qualitative interviews. This method was chosen because the topic of this thesis requires more in-depth information and being able to ask clarifying question during the interviews was essential in order to understand the results. A qualitative research method studies the participants expressions and connected relationships (Saunders et al. 2019, 180), which is essential for this research.

The concept of validity and reliability needs to be considered by the researcher in order to determine the quality of the research. Validity refers to the relevance of the research and the correctness of the results analyzed (Saunders et al. 2019, 214). Basically, the validity communicates if the right things has been researched and if the most appropriate methods has been used in order to achieve the planned purpose (Saunders et al. 2019, 214).

Reliability concerns the ability to replicate a research design used in the past and the consistency of the research (Saunders et al. 2019, 213). A reliable research is described as a research that can be replicated and the results given are the same as in the previous studies (Saunders et al. 2019, 213). Replicating a qualitative research is often quite difficult, for example because it is impossible to replicate the social environment that the first research is done in (Bryman & Bell, 2017).

The validity of my research can be determined as relatively good. The reason for this is that the method used for the qualitative interviews, the people interviewed, the process of conducting the interviews and analyzing them is transparent and are described in detail in this thesis, which increases the validity. In addition, the result that were received provides the commission company with useful information about the risks and challenges that can occur during Heavy lift transport to Norway and should be considered in order to reduce the possibility of additional costs occurring.

The reliability of my research can be determined as difficult to accomplish (as previously mentioned), because the answers that were given in the interviews can differ depending on several factors, for example the social environment that they were conducted in. The interview questions dealt with, were based on each respondents' personal experiences. Depending on the person interviewed the answers could differ depending on the experience they had about the issues that the questions concerned, which also could be noted by looking at the result of the qualitative interviews. Despite this, some similarities between the answers could be found with the respondents that had similar positions in the companies or had been involved in the same transport operations. Similar answers would most probably be achieved in case the interview was replicated, even if the experiences would have evolved after the first research.

4.2 Results

In this chapter the results from the qualitative interviews are reviewed and the results are divided in accordance with the theoretical framework. Eight interviews were conducted with people that had experience with transport or sales to Norway, and in order to get as much information as possible most of the respondents worked with transport or export.

Every question is reviewed in a few separate paragraphs under the chapter that it is connected to. The answers will be reviewed below, and in case there are similar answers between the participants, they will be combined. If anyone of the respondents has pointed out something specific, it will be underlined individually for that person. The interview guide used, with the interview questions, can be found in the appendix.

4.2.1 Respondents and interview questions

The interview questions cover risks and risk management, logistics and distribution, documentation, customs, heavy lift and relevant information about regulations and challenges when transporting in Norway. All the points addressed in the interviews has been designed by the help of the theoretical framework. One interview guide was used as groundwork for all interviews, with some changes in case needed. Additionally, questions that the respondents could not answer were left out.

The interviews were executed through calls on Microsoft Teams and the duration of the interviews were about 30-40 minutes for each respondent. The interviews were recorded and later transcribed, the transcripts and recordings were deleted after the thesis was finalized. Additionally, the interview questions were communicated to the respondents by email before the scheduled interview.

Some of the respondents hoped to be anonyms in this research, therefore the names of the respondents or the companies that they work for will not be mentioned in this thesis. However, the titles and experience of the respondents are introduced and described in Chapter 8 Appendices, Appendix 2 in more detail. In the results the respondents are separated by the help of the letters A-H and from now on, if anyone of the respondents have mentioned something that differs from the rest, they are referred to individually with the given letter A-H (described in Appendix 2) in the results. The respondents were a mix of employees at the commission company and respondents from outside of the company, below there are short descriptions of the respondents. More detailed descriptions are available in Appendix 2.

Respondent A-C works for the commission company as Heavy lift and Project Cargo Coordinators. The tasks that they have includes organizing transport for various types of goods, including heavy lift. Respondent A-C have diverse experience within their current position. **Respondent D** works for a transport company as a Transport Manager. He had worked with transport for a very long time with various tasks and had a lot of experience with oversize transport. **Respondent E** works for the commission company as a Sales Manager with Sweden and Norway as the main sales areas.

Respondent F works for a transport company as a Sales Manager with various types of tasks and he had worked with transport and logistics for years. **Respondent G** works as a Project Manager at the commission company, he had managed a few projects to Norway and had

one year of experience in the current position. *Respondent H* works for a shared function in the commission company. She had worked in the current position for a few years with various tasks from creating export declarations to booking transport for different types of goods.

4.2.2 Heavy lift

Along employees at the commission company heavy lift was described as goods or a shipment that differs from the standard goods and/or shipment due to its weight and/or measurements. Heavy lift requires possible special arrangements due to its size which usually includes special transportation equipment and transportation permits. Respondent A and B mentioned that the commission company determines heavy lift as a product that weighs over 25 tons and has large dimensions. Respondent B said that when the product is over 25 tons in weight it is automatically defined as heavy lift despite the measurements. Additionally, the product can be categorized as heavy lift even if the weight is under 25 tons, but the measurements exceeds certain limits. Respondent H said that there was a table made by a unit in the commission company, that is no longer active, that was responsible for the heavy lift operations. This table described heavy lift as a shipment that has a value of 500,000 USD or a weight that exceeds 25 tons. However, it is possible that the shipment is under 25 tons in weight but exceed 3,4 meters in width or 3,3 meters in height and is categorized as heavy lift.

Respondent D referred to heavy lift as a product that weighs over 100-150 tons and is transported with multiple transport modes including several handlings and liftings. Respondent D also underlined that heavy lift probably is something that does not have one explanation and depends very much on the destination and company. Respondent F referred to heavy lift as goods that exceeds the measurements and weight of normal transport, and the limit depends on the country where you are operating. Respondent F also mentioned that normal transport in Norway lies below 25 tons in weight and 2,55 meters width, 3 meters height and 14 meters length.

The factors that cause most challenges when dealing with heavy lift among respondents A-C and E was the size and the complexity of the product. A heavy lift product usually requires special arrangements, transportation permits and special transportation equipment because of its size. The size of the product causes challenges in road transportation, which makes the transport complex. There are regulations for carriage by road in every country, which affects

the transport of heavy lift. These regulations have become stricter in Norway during the past few years and it is increasingly common that heavy lift is carried by sea to the nearest port in order to reduce the carriage by road. If the shipment weighs over 60 ton it might be necessary to reduce the weight of the goods during carriage, in case it is possible. Respondent B mentioned that the destination site also has its own challenges. Sometimes transformers are delivered to wind farms distant from normal infrastructure and services. In case the site requires any possible changes and there is no equipment available at the destination, it might cause additional expenses.

Respondents D and F referred to challenges such as maintaining the timetable, changes in the timetable and measurement adjustments. There are many parties involved in the carriage of heavy lift, and the heavier the product, the more parties are involved in the transportation. In case the timetable changes or it cannot be maintained this has a significant effect on the workload and basically everything needs to be planned again. Making new plans with several parties has its own risk and the new timetable does not necessarily suit everyone, which requires more and more changes. The consequences in these kinds of situations are very much dependent on the individual case, but in worst case scenarios it might cause additional costs and delays in deliveries. The planning of transport needs to start early and usually the product is not complete and the measurements are preliminary way ahead of the actual delivery. When the delivery is getting closer and the final measurements are available, adjustments from the preliminary measurements can occur, which might require new plans for the delivery. In case there is an increase in weight it might require additional or larger lifting equipment for the transportation, and this might affect the price of the transport. Additionally, the transport agreements, price and transport plan need to be reconsidered.

Respondent G said that the customs procedures and the responsibility linked to them was a challenge. He had encountered some difficulties with the customs procedures because of miscommunication and incorrect information about the incoterms in the acknowledgement of order. This was because of a special sales agreement which caused challenges with the customs procedures. Basically, there was a miscommunication between the incoterms DDP and DAP, during the same time as when there was a transition ongoing in the commission company. After this incident, four additional projects that were sold under the same kind of sales agreements were found and the challenges with the customs could be solved by tax registration of the company in Norway.

The respondents considered planning important when working with heavy lift. This concerned planning of the route and any requirements of the route, possible special arrangements, requirements of the destination, insurance and the timetable. It is important to start the planning well in advance to make the process as smooth as possible and to remember that the timetables should not be planned too tightly because the size of the product will not allow it. The transportation of heavy lift usually requires special arrangements such as transportation permits, police escorts, warning cars and inspectors when crossing bridges, which all calls for planning in advance. Respondents D and F pointed out that it is important to make sure that the measurements are correct, otherwise this might cause additional expenses and new plans. Depending on the destination, there might be some things important to consider when transporting heavy lift. This concerns the route that the goods are carried on and the requirements of the route, such as weight limits. The climate and weather conditions in the destination should also be considered, for instance in Northern Norway it is not possible to carry heavy goods in certain seasons and that should be considered when planning for transport. Respondent F said that insurance is important to consider because heavy lift is usually considered as high-cost goods and having separate insurance for the product is considered important. Respondent F also added that knowing the responsibilities of every party involved in the transport was considered important. When the responsibilities are not clear there has been a clear miscommunication between the parties which usually can cause confusion.

4.2.3 Risks and risk management

The transportation of heavy lift to Norway has proceeded well, without any accidents or damage to goods avoiding any major delays in delivery. Respondent D said that planning transportation to Norway requires more tolerance and capacity in the planning and the respondents saw it necessary to start the planning way ahead before the actual delivery. Respondent F said that there has been some damage with one heavy lift foundation at a site in Norway and it was a bit unclear whose responsibility it was to fix the damage, in the end the damage was financed by all parties involved equally. Otherwise the respondents did not have any information or experience with damage or accidents. Respondent F said that there have been some delays in transportation to Norway because there are many things that affect the transport.

Respondent B said that heavy lift requires transportation permits and the handling time for the permits can be up to a few weeks. Respondent D and F said that it also requires that information needed for the permits are provided in time to the party applying for the permits. In case the information is not provided in time, this might cause delays in delivery. Additionally, the regulations for road transport has gotten stricter in Norway. Respondent D and F mentioned that it is common that heavy lift carriage in Norway requires governmental authorities during transportation, this include police escorts, warning cars and any bridge calculations or inspections. Respondent F said that in case the transportation requires any of the special arrangements referred to above it is usually mentioned by the governmental authorities who provide the transportation permits. Additionally, the authorities inform respondent F about any possible challenges on the route that should be considered when planning the timetable for the transport.

Respondent F added that the customs operations can cause delays in delivery in case the documents are not done in advance causing waiting times at the customs. He added that, usually special transport happens during the night and in case the documents are not ready in time there is a chance that the customs office has closed and need to wait until the morning to get the goods through the customs. The weather conditions cause delays in delivery to Norway, especially in the mountains and in the Northern Norway, when there is for instance blocked roads because of the weather or because there is a need of ploughing snow off the road during winter. Respondent F said that depending on the destination in Norway the weather conditions also affect the time of delivery, since the weather might not allow transportation during a certain timeframe or season which needs to be considered when planning the transportation in order to avoid delays.

The participants have not experienced any major difficulties with the finance or invoices. The participants referred to the long payment terms and nobody were aware of any significant delays in payment. Respondents A-C usually invoice already in advance discussed transport bills or customer invoices that has been approved by the project managers that are later invoiced by them. According to respondent B the transport bills are usually very well explained and if any additional costs occur the carriers inform about it before sending the invoice. Respondent D and F also saw this working well and they had not experienced any problems with the invoicing. Respondent A was a bit concerned about the installation fees that are invoiced together with the transport costs. He did not necessarily see it is a problem, but since the respondent A is not on site during the installation, it is a bit difficult to know how much time it took to install the heavy lift item.

Respondent E mentioned that sometimes it is challenging to maintain claim management in the company, for instance when the customer fails to receive the goods and there should be happening something immediately and the information about any irregularity reaches the customer late. Respondent F mentioned that at times there are challenges during the transport, that could not be identified before the delivery that causes additional costs, such as removing traffic signs or making changes to the road to make the transportation possible. In the end it can be difficult to steer the costs to anyone, because nobody could identify the risk beforehand. He gave an example on a project that was delivered to Norway where there were changes required on the way to the site, usually changes on site are assigned to the customer while changes required on public roads are assigned to the seller. In this case the respondent F did not know where the road to the site began and in the end the costs for the adjustments were assigned to the seller. In the end this did not affect the delivery negatively and the delivery was on time, but there were additional expenses.

Most of the participants had experienced the cooperation, communication, sharing information and material working well between the different parties within the company. Respondent A-C said that the information needed for the delivery is always received, but sometimes the information is received later than they would like. Respondent A-C also added that sometimes they are required to ask for the information to receive it, taking own initiative was appreciated. Respondent B saw this lack of communication affecting the job performance, because he experienced that tasks start to pile up when there is a lack of communication and information is not received early enough.

In the commission company respondent E asks for transportation indications from the respondents A-C and provides them with information about the product and place of delivery. Respondents A-C request an indication from among others respondents D and F, which are shared with among others respondent E. Respondent A wished to get more detailed information about the delivery place to be able to get a more precise indication from among others respondent D and F, that would be more useful in the point of sale. Respondent A also said that it has been a bit unclear lately which incoterm is used in certain deliveries to Norway. He added that when there has been changes concerning the incoterm it has not been communicated well between the different parties which has caused confusion, and it has been unclear which incoterms should be used. Respondent E pointed out that there can be a long time between the given transportation indication and the actual delivery, and the whole process should be monitored again in case there is additional information to the transportation during this time. He also added that he would like to get a fixed price for the

transport including the risk, instead of an indication, where the risk needs to be added to the sales price. The reason for this was that the actual expenses have many times exceeded the given indication.

Respondents D and F said that the communication worked well, and they did not experience any difficulties with the communication. Respondent G pointed out that everyone are reachable, but by different communication channels (email, phone, face-to-face, teams). He said that the communication works well, but everyone cannot be contacted in the same way and you need to have an eye for which communication channel works best for which person. He also pointed out the difference between the actual price and sales price for deliveries to Norway, he experienced that the company takes a significant risk transporting a heavy lift item to Norway both by sea and road. He referred to situations where a project to Norway is sold without knowing if there is a crane at the arriving port, in case there is no crane, the carrier will offer one for a high price which simultaneously increases the cost. The difference between the actual price and sales price usually occur when it is sold and becomes a project. He pointed out that this could be avoided by adding a larger sum for the risk when it comes to transportation by sea and road or adding some transparency to the sales price, meaning that the actual price would be invoiced with a 15-20 % margin that would include costs for documentation and project management.

The participants experienced the cooperation, communication, sharing information and material working well between the different parties outside of the organization. Respondents A-C said that the communication with the carriers differs, but usually they have received the needed information. Respondent C said that a few times there has been some misunderstanding between the parties but that has been solved quickly without any consequences. Respondents D and F felt that the communication and receiving information worked well with A-C, and respondent D mentioned that he thought it was positive that respondents A-C had a shared email where everything is documented. He also pointed out that the tenders that they receive from A-C are usually well informed and usually if they win the tender there is no need to ask for additional information. Respondent D said that usually the site visit before delivery determines the transportation, but one thing that he felt as a challenge was giving transport indications for transportation one year ahead, with limited information. Despite this, he understood the manner and wished to be provided with every fact about the destination in case it was available to be able to give accurate transportation indications.

Respondent E said that they usually get enough information through the tenders, but he hoped to receive more detailed information at times, because sometimes the destination site has challenges or limitations that affect the transport and costs significantly in the end. Respondent F said that he has experienced the sea transport companies as a challenge, because receiving information from them might take some time. Additionally, respondent F mentioned that the communication with governmental authorities in Norway can be slow and because of this there can be delays in delivery. Respondent F said that sometimes getting an approved permit depends on the person issuing it, because decisions about permits vary from time to time and he felt like some decisions are made in favor of protecting the local traffic in Norway. Respondent D and F also added that the transport equipment and the regulations for road transport differ from the Finnish which usually means that Norwegian transport equipment is required when carrying goods by road. Respondent G experienced that he has received the needed information from the customer and as a project manager he pointed out that he should be aware of things and information that is needed from the customer.

4.2.4 Logistics and distribution

Respondent A said that the company usually delivers the product the whole way to the destination site using DAP or DDP. Respondent A and B said that they did not know the reason why these incoterms were used, and they were both wondering why the incoterm DDP was used, since it was not an incoterm favored by the commission company. Respondent E said that incoterm DDP is used because the customers usually require that the incoterm is DDP instead of DAP. He added that the commission company does not have a way to offer the sale as DDP so when a project is sold by the front-end-sales and then transferred to them it is stated as DAP instead of DDP on the sales documents.

The functionality of the incoterms used was experienced different between the respondents. Respondent A said that DDP has been the simplest incoterm because they receive assistance with the import declaration, and they work closely with the contact person. There have been some changes in the commission company lately which respondent A referred to. The commission company has recently tax registered themselves in Norway to make the import with incoterm DDP easier. Respondent A added that DDP is a bit problematic because the seller is responsible for the taxes, which adds expenses. Respondent B experienced DDP as challenging and preferred DAP instead. Respondent B added that FCA deliveries are a challenge because the time schedule is not in control of the company and you cannot be sure

when the transformer will be picked up. Respondent C added that he has felt some confusion between the incoterms DDP and DAP, because there had been a few deliveries where there had been miscommunication about the incoterm for the delivery.

Respondent C added that he prefers DDP, because the seller is responsible for the customs declaration. Respondent E said that in some cases it is unclear with the incoterms who is responsible for additional services, for instance at the site when there is a need to sand the road or guide the carrier at arrival. Respondent G said that he once had problems with the incoterms when there was a transition happening in the company at the same time and the company was not tax registered in Norway which made it impossible to import the goods into the country (this miscommunication was already mentioned in results of Chapter 4.2.3). Respondent G added that there were a few lessons learned after this incident, and now he is more aware of informing the customer about the responsibilities the incoterm determines for the customer. Respondent H is many times responsible of creating the export declaration and import declaration for heavy lift shipments on their way to Norway. Respondent H experienced the process of DDP shipments clear yet challenging. The reason why she experienced the shipments challenges was because the seller is responsible for the import declaration in the destination country and the import declaration for DDP shipments are done through a representative in Norway. She added that it is challenging because it is handled locally and the process with the representative is still a bit unclear, since the procedure is relatively new for the commission company due to recent changes.

The modes of transport used for the carriage of heavy lift from Finland to Norway in the commission company was road and sea. The most cost-effective and simple way to transport heavy lift transformers was by road with a truck, trailer and other special transport equipment. Respondent A said that in some cases transport is done as a combination of road, sea and ferry transport. Moreover, respondent A and B mentioned that the heavy lift goods are getting larger, the regulations of road transport in Norway limits the transport by road, and it has become more common to transport the transformer from Finland to a port near the destination site in Norway to reduce the carriage by road. Respondent F said that the Norwegian authorities does not usually approve carriage by road for a very long time and it is usually only approved, in case the destination is close to the border. Maximum 150 km from the border, otherwise sea transport is required to the nearest port. Respondent F added that sometimes sea transport is also required because of the nature and infrastructure, in case there are challenging bridges or roads. He also added that there are several small ports on the coast of Norway, where the goods can be shipped to reduce transport by road.

Respondent D and F said that the transport mode chosen was probably selected based on the price, because transportation by sea is much more expensive than transport by road.

All respondents had experienced the use of road and sea transport work well. Transport by sea takes a longer time than carriage by road and none of the respondents felt that this had affected the delivery negatively, because the transit time was considered in the planning. However, there were a few differences with these transport modes. Respondent B mentioned that there are more factors affecting carriage by sea than carriage by road. Sea transport can significantly be affected by the water levels for example, while road transport is basically only affected by the engine breaking. Respondent D said that there are more risks transporting by sea, because the more port handlings and liftings there are, the risk increases. He added that there is less risk when the product is not handled and is carried in the same vehicle the whole time, even if the vehicle boards a raft or ferry during the way the risk is smaller than when there are many handling or liftings. Moreover, respondent D added that the functionality has been good, but when the goods are shipped by sea an additional party is added to the operations which also needs to be considered in the planning. Respondent G said that the schedule for the vessel departures are usually unsure in the beginning and the final schedule is confirmed later, which differs from road transport that is more secure.

4.2.5 Documentation

The documents required in carriage from Finland to Norway are road waybill, export declaration, import declaration, commercial invoice, packing list and package markings. Respondent C said that gross weight tags on the goods are also needed when the weight exceeds 25 ton, and respondent F added that the transportation permit and truck registration should be available. Respondent D also added that the commercial invoice is used as groundwork for both export and import declarations and is required by the customs. Respondent A and F said that insurance for the goods are also necessary but that is handled before the delivery since the goods are categorized as high-cost and a separate insurance is necessary. Respondent B said that when the waybill, commercial invoice and export declaration are displayed at the customs office the seller is provided with proof that the goods have exited the country, the document is called exit notification. Which is important due to tax issues, because the seller needs to have proof of the goods leaving the country.

The respondents experienced some difficulties with the documentation. Respondent A said that usually when heavy lift transformers are transported to Norway it includes a lot of heavy

lift accessories that will be installed in the destination, which requires several vehicles. He mentioned that in case a loading plan for the goods is not provided early on from the carrier, this results in the need of creating the documents at the time of the pick-up, which makes the situation stressful. Respondent B experienced some challenges with the customs documents when the incoterm DDP was used, since there had been some difficulties with the import of goods to Norway. They said that it is challenging to find someone who can issue the import declaration for the goods in Norway when DDP is used. Respondent F experienced some difficulties due to documents being provided late and because the documents required correction.

There were a few things that the respondents considered important in the documents when it came to Norway. Respondent A said that when the goods are carried by road, the documents need to be in accordance with the way the goods are transported or according to the loading plan. The reason for that was that the goods might exit the country in several trucks and the documents needs to be in accordance with the goods in each truck. Respondent A added that the documents made for sea transport is not as exact. Respondent B said that one thing that needs to be mentioned in the documents when goods are transported to Norway are the company's tax registration number in Norway (in case DDP incoterm is used) and the commodity code, unlike from transportation within the EU. Respondent H said that the commercial invoice usually provides the most important information, that includes details about the product such as value, number of pieces, commodity code and country of origin. She added that in case all of these things are stated in the invoice, this usually is enough.

4.2.6 Norway

There is rules and regulations that affect the transportation of heavy lift in Norway and the regulations that was mentioned by the respondents was the limitations for weight and measurements in road transportation, the need of transportation permits and requirements for governmental authorities during transport, such as police escort or warning cars.

According to respondent D the transportation becomes complex because the regulations differ from one nation to the other and the route and vehicle used for the transport are affected by the regulations. Respondent D added that the route that is used might determine new criteria for the vehicle used and there might be a need of special vehicles for the transport. In some cases, there is even a need of using Norwegian transportation equipment

instead of Finnish, in order to get the transportation permit approved. He added that in these cases they are required to contact their partners in Norway and find out if they can offer transport with their equipment, otherwise sea transport is used. Respondent B said that sometimes police escorts are required, for example when the destination is near a border. Respondent D said that warning cars in the front and the back are regulated individually for each heavy lift transport and there are no specific regulations in the EU. Respondent D also added that the need for a warning car in the front is when the width of the goods exceeds 3 meters, and the one issuing the transportation permit determines the need of an escort vehicle in the back.

Respondent F and G experienced that there is a difference on which authority is used for the transportation permits if it is approved or not. Some official might approve of road transport while others would not, it differs from one person to the other. Respondent G added that not knowing any criteria for what unit can be carried by road and which needs to be carried by sea affects the planning of the timetable, because the criteria are evaluated separately for each case. He also added that for many heavy lift shipments there is ways to reduce the weight of the shipment during transport, especially the ones that weighs over 50 tons. Respondent A experienced that the transport becomes more complex because of the regulations, because sometimes the weight requires sea transport and there are several handlings or offloading's included, which causes a challenge. As mentioned earlier, the less the goods are handled, the less risks there are. Respondent E said that the heavier the goods are the harder it is to get an approved transportation permit. Respondent B said that it is always a challenge when dealing with administrative people such as the police, because you have agreed on a time which is not always fulfilled. Additionally, that results in more parties involved in the operation that needs to be considered in the transport planning.

The nature, weather, infrastructure and landscape cause most challenges when transporting in Norway. Respondent A said that if the destination site is on the mountains or in a cave it causes challenges, sometimes there might even be a need of using an additional car for pulling the cargo up the mountains. He also added that it is easier to operate in Norway during summer. The additional challenges and difficulties caused by the nature, weather, infrastructure and landscape (that was mentioned in Chapter 4.2.3 Risks and risk management where most of these challenges was pointed out).

The customs procedures in the commission company are assisted by a separate function in the company that helps different departments in the company with among other things the import and export declarations. Respondent H is working for this function and according to her they have agreements with seven carriers that handles their own customs procedures when exporting and importing. When carriers outside of those that this shared function has agreements with are used, a representant does the customs procedures on behalf of the company. The representant is called SA-TU logistics and they provide a range of different logistics services including making the export declaration for the commission company. It is common that the customs procedures for heavy lift shipments to Norway are done by a representative since the main carriers for these shipments does not have agreements with the shared function. Additionally, for the import declaration when the goods enter Norway the Norwegian KGH Customs is used.

When respondent H is about to make the export declaration for a heavy lift shipment, she receives the invoice and packing list from the unit that wants her to create the export declaration. The invoice is transferred to SAP Global Trade Services (GTS), where respondent H creates a message exchange electronically in order to send it to the representative or the carrier. The message exchange provides certain information, such as product, tax code, weight, value, modes of transport, destination, etc. When the message exchange is done, it is sent to the carrier or representative who then creates the actual export declaration and declares the goods from Finland. Respondent H added that the incoterm determines which party is responsible for the import declaration when the goods arrive to Norway. If the incoterm is DDP the seller is responsible for the import declaration, and if the incoterm is DAP the receiver of the goods is responsible for the import declaration. Respondent H said that KGH Customs in Norway is used for the import declaration, when the incoterm is DDP. In these cases, respondent H provides them with the invoice, EAD, packing list and truck plate number to them so that they can create the actual import declaration.

Respondent D and F mentioned that the customs procedures usually proceed well if the documentation are handled and provided in time, otherwise there might be waiting times at customs. Another thing that might slow down the process is if the customs office is closed and there are waiting times which also cause additional expenses. Respondent G experienced that the carriers are not always aware of the public holidays in Norway, which also affects the opening hours of the customs, therefore there has been a need to wait at the customs. Respondent A experienced the customs in Norway as easy going because there is rarely any

need for additional investigation, he added that from where he stands the customs procedures has proceeded well.

The documents that are required by the customs are the commercial invoice, packing list and export declaration. Respondent A, C and F added that the waybill is not required, but it is a useful document to have around. Respondent F said that the import declaration should also be done before arriving to the customs, referred to as TVINN declaration. He also added that the transportation permits are useful, since the customs might weigh the truck. In case the weight is incorrect from what is stated on the permit it can cause significant charges to the carrier. The respondents also said that it is helpful and necessary to use professionals to create transport documents including customs declarations to avoid unnecessary mistakes. None of the respondents was aware of or had experienced any customs restrictions that could affect the transportation of heavy lift to Norway.

Temporary export of accessories or installation equipment for heavy lift installations are sometimes required, for example when the shipment is emptied of oil before transport to reduce the weight. The respondents had experienced temporary export in some extent. Most of the respondents did not have any experience in heavy lift products being exported temporarily (only installation equipment or accessories that belongs to the heavy lift shipment), except respondent B that mentioned that there was a heavy lift shipment exported temporarily for testing to Norway. Respondent A said that sometimes when heavy lift goods are emptied of oil before transport, the goods needs to be filled up with oil again in the destination. In these cases, the service department at the commission company sends oil pumps to Norway as a temporary export. The oil pump is usually exported together with components or accessories that belongs to the main heavy lift product and returned when the work is finished. The same function in the commission company that assist with the export declarations, also handles the import documents and other documents needed for the temporary export of the oil pump.

Respondent B said that the thing that differs between temporary export and direct export are the documentation. Temporary export requires a few changes to the regular direct export documents, for example the fact that the shipment concerns a temporary export should be mentioned in the documents. Another thing that sets temporary and direct export apart is the fact that there is a limited time for the temporary export and within the agreed time the goods should be returned. In case the goods are not returned during the agreed timeframe this will result in paying taxes for the export, which is avoided by temporary export. Respondent B

also mentioned a few challenges with exporting temporary. He suspected that the challenges that occur in temporary export might be caused by not knowing when the goods are returned or the fact that the goods cannot be offloaded before the customs declaration is done. The reason for this was that the customs has the right to check if the goods are the same as when exported, and in case the goods are offloaded in an unknown place the customs cannot check the goods, which becomes a problem. He added that therefore it should be communicated clearly that the transportation concerns temporary export, in order to avoid problems. Respondent D had temporarily exported installation equipment for the commission company, and it had proceeded well without any significant problems. While respondent F experienced the temporary exports as a challenge, because the equipment exported was not usually mentioned in any documents and when they are exported temporarily the goods require their own documents.

Respondent H experienced temporary export as challenging, because it requires a confirmation of exit document when the goods exit the country. She added that there has been times when receiving the document has taken some time, and without it the goods cannot be returned back to Finland. Another challenge was also mentioned by respondent H, which concerned not knowing when the goods will return to Finland. This has caused challenges such as waiting times at customs that might have caused additional costs, because nobody knew the goods were about to return. Respondent H said that the documents that are required for temporary export includes a separate commercial invoice and packing list for the goods exported. Additionally, a return form completed by the unit needs to be provided together with the confirmation of exit in order to declare the goods back to Finland.

5 ANALYSIS

The main findings of this research can be reviewed in this chapter and the analysis of the interview results are presented. The analysis is done to understand any connections and differences between the actuality and the theory applied in this thesis.

The interviews revealed that the definition of heavy lift depends on the destination country and company. In the commission company heavy lift is determined as a shipment that weighs over 25 tons or has a value of 500.000 USD. However, the shipment can be categorized as heavy lift even if the shipment weighs below 25 tons, but the measurements exceeds 3,4 meters in width or 3,3 meters in height. Basically, in case any of the criteria mentioned (weight, value and measurements) is fulfilled the shipment is categorized as heavy lift by the commission company.

Regarding risks the interviews revealed that delays can happen because of several reasons when transporting heavy lift. Delays in transport was one of the risks referred to as a physical risk, risks that affect the motion or warehousing of materials (Waters, 2011). Delays can be caused by waiting times at customs, requirements from governmental authorities, regulations, destinations site not being ready, weather, landscape and adjustments, changes not known in advance, etc. Maintaining and changing timetables in heavy lift operations affects the workload significantly and it can cause additional expenses. Providing the correct measurements and weight for the goods is remarkably important and requires accuracy, because the changes might require new transportation plans which might affect the cost of the transport. Additional expenses in transport can be caused by any form of delay but also because of the lack of information or limited information about the destination site which has been noted by the differences between the planned cost and actual costs for heavy lift transports to Norway in the commission company.

The respondents described the regulations for transport by road and transportation equipment in Norway as exceedingly strict. One of the things that makes heavy lift transport complex, is the fact that regulations differ from one nation to the other. Factors such as the size of the goods and route might set additional criteria on the transportation equipment used in transport to Norway, because the infrastructure and equipment in Norway differ from the Finnish. According to Hörkkö et al. (2010) one of the disadvantages of road transport was the difference in weight and dimension regulations on vehicles from one nation to another, which can cause challenges in the transportation of heavy goods, such as heavy lift. The size

of the goods and destination will also determine if any vehicle escorts are needed during transport or if any authorities such as police needs to be present during transport.

Road and sea are the most common modes of transport used for heavy lift transportation from Finland to Norway. The mode of transport used is to a great extent regulated by the destination and governmental authorities in Norway. The regulations of road transport in Norway makes transportation of heavy goods challenging because the regulations determine whether the goods need to be transported by sea to the port nearest to the destination site or if the goods are approved for transportation by road. Transportation by road was experienced as the most cost-effective and secure mode of transport. According to Hörkkö et.al. (2010) road transport is a popular mode of transport because of its cost-effectiveness. Transport by sea was experienced as expensive causing an increased risk due to the handlings and liftings required and results in adding another party to the operations that need to be considered in the planning.

Additionally, the landscape, nature and weather conditions in Norway cause challenges in heavy lift transportation. For example, the long winters and the mountainous landscape in Norway causes challenges in transport. Additionally, the weather conditions and nature can affect the possibility of delivering a product to the destination during certain seasons and the time of delivery should be planned in consideration of this. According to Statens vegvesen (2020) the road network and the varying quality of the roads cause challenges in road transport in Norway and driving with heavy loads during winters requires caution and an experienced driver.

Regarding the documentation it could be determined that creating documents requires professionalism, promptness and exactness. In road transport it was especially important that the documents are made in accordance with how the goods are transported, if many trucks are needed, so that the documents are in accordance with what is transported in which truck. The commercial invoice or proforma invoice was determined as one of the most important documents needed, because it provides all needed information and it is used as groundwork for the customs documents. It was determined that the invoice should include information about the product, such as number of pieces, weight and measurements, value, country of origin and commodity code. Information about the country of origin and the commodity code for customs should be provided when the goods are transported to a non-EU country.

Other important documents that were mentioned in the interviews was the packing list, road waybill and export declaration. The export declaration is needed when goods are exported

out of Finland to a non-EU country. The customs procedures proceed well when the documents are handled in advance electronically, avoiding waiting times at the customs office and additional costs for the waiting. Moreover, the public holidays and opening hours of the customs office should be considered in order to avoid waiting at the border. Working together with professionals' unnecessary mistakes in the documents can be avoided and by providing the documents in time with the correct information expensive waiting times can be avoided.

The incoterms that has been used for the heavy lift transportation from Finland to Norway in the commission company was DDP, DAP and occasionally FCA. The interviews revealed that the incoterm used was regulated by the customer requirements, and the customers usually favored the incoterm DDP instead of DAP. Incoterm DAP was favored by many of the respondents, because the receiver of the goods is responsible for the import declaration in Norway. DDP shipments was experienced as manageable, but difficult. This was due to some miscommunication about the incoterms in the organization, problems regarding the value added tax (VAT) and the fact that the seller is responsible for the import declaration in DDP shipments. The import of goods to Norway needs to be handled locally in DDP shipments, and the company's processes with the local customs broker in Norway is still a bit fuzzy. This has caused difficulties when importing the goods to Norway and has required lots of adjustments before the goods were declared for import.

Regarding temporary export it could be determined that they are sometimes required in heavy lift shipments, if the goods has been modified before transport to reduce weight by for example reducing the amount of oil inside the goods. In case oil has been emptied for transportation, the oil needs to be refilled at the destination site. The temporary exports are challenging because it is not always clear when the goods return, and the goods require a document from customs that proofs the exit of goods from Finland. Without this document the goods cannot be returned. The goods that are temporary exported requires separate export documents to make the customs procedures as simple as possible. There has been some difficulties with the documents, which has caused waiting times at customs, causing additional expenses.

Providing detailed information in transportation indication and tenders (made in the time of sale and before the actual delivery of goods) was a suggested way to reduce risk of additional expenses in transport. In case the transportation indication is given way ahead of the actual delivery it is essential to check the price again when the delivery is coming up to have time

to reevaluate the costs again with the customer in case additional costs appear when the indication is reexamined.

The respondents agreed on planning being one of the most important things to consider when working with heavy lift. The heavier and larger the goods are, the more parties are involved in the operations and the sooner the planning of the transport should start. This involves planning and arranging the timetable, responsibilities, carriage, route, insurance, documents, customs and other special adjustments, such as transportation permits, bridge calculations, bridge inspectors, vehicle escorts or police escorts during transportation. Most importantly, the risks and challenges involved in the transportation can be prevented by extensive planning.

6 DISCUSSION AND CONCLUSION

The objective of this study was to identify the risks and challenges involved in the transportation of heavy lift from Finland to Norway. The goal of this study was to successfully gather the risks and challenges and provide the commission company with usefulness through general guidelines of what transportation risks and challenges should be considered in the time of sale.

The research questions aimed for this study was answered to a great extent. Things that were important to consider in the transportation of heavy lift was answered well through the qualitative interviews and went hand in hand with how challenges and risks could be prevented and prepared for. The most important things to consider included planning and providing detailed information. The planning of transport should start early, and the timetable should be considered thoroughly. The size of the goods should be accurate because the goods usually require special adjustments and special transportation equipment, and the planning of these aspects should start in time because any major changes could result in new plans and additional expenses.

The physical risk in transportation of heavy lift to Norway could be considered as high, because there are many aspects that affect the transport. The main challenges that was identified and that usually are connected to the risk of delay included among others the strict regulations for road transport and transport equipment. Furthermore, the mountainous landscape, challenging weather conditions and the need of accuracy in the required documents was considered important to prevent delays. The customs procedures were

considered as a challenge in case the required documents were not provided in time or included incorrect information. Additionally, to prevent delays and miscommunication in transport the responsibilities of the parties involved should be clear.

The financial risk in transportation of heavy lift could be considered as high, since most of the delays in transport are connected to additional costs. Every form of delay could end up in additional expenses, such as waiting times at customs, changes in measurements or transportation plans and timetables, and any special adjustments such as removing traffic signs on the route or making changes to the roads could cause additional expenses in transport. The differences between the planned cost and the actual cost set for the shipments going to Norway was a rather standard risk. The actual costs had exceeded the planned cost significantly several times, especially in shipments where both road and sea transport had been used. These differences were due to limited information about the destination site or port.

The information risk and organization risk did not cause any direct risks on the transportation of heavy lift to Norway. However, the lack of information or material, could be concluded as a factor that affects the transport negatively in forms of additional costs and delays. For example, when there is a lack of information or limited information about the destination, it could cause additional costs. Otherwise, the communication and sharing information inside and outside the commission company could be concluded as good, as long as the information is correct, and the information linked to the transport is provided in time to the parties that are involved.

The theoretical framework of this study could be divided into three major parts, including heavy lift, risks and risk management, logistics and distribution. In the beginning it was a challenge to delimit the theory and deciding what should be included in this thesis. The process of finding theory went quite well, but there was little to no theory found about heavy lift and due to this, all information about heavy lift was gathered through personal communication and internal sources at the company. Otherwise, I would consider that I found useful theory that was essential for the planning and understanding of the empirical part of this study.

The empirical part of this study included eight qualitative interviews. I thought that the interviews were very interesting and gave me a lot of useful information. I would consider the interviews as successful, even though conducting interviews was completely new for me

and transcribing the interviews took quite some time. The interview guide worked moderately for all the participants; I could have modified the interview guide a bit more for some of the respondents in order to gain more information. Moreover, I could have asked more questions about how the risks identified were managed and controlled, because afterwards I felt that there was a lack of information on this front. Basically, I would have needed to ask more questions about the risk management of these risks, which would probably require more respondents with more experience of the management.

I would consider the objective of this study as fulfilled. The aim was to create usefulness for the commission company by gathering the risks and challenges involved in the transportation and provide general guidelines for what challenges and risks should be considered in the time of sale. I experienced that the interviews revealed a lot of useful information about the risks and challenges involved in the transportation of heavy lift that will be of use for employees at the commission company that are not involved in the transport itself, such as the salespeople.

Some of the risks and challenges identified in this thesis are still quite general, as for the management of them. For future research the risks identified and the management of them could be studied more in-depth including information about how the cost of the risk is determined at the time of sale and how it differs from the actual cost of the risk. In addition, the risk management of the identified risks could be researched more, to get a bigger picture of how these risks have been managed before, and how they could be managed in the future, to get the best possible prevention.

Finally, I would like to give many thanks to everyone that participated in the interviews and provided me with valuable information needed to complete my thesis. I would also like to thank the commission company for giving me this opportunity, and my thesis supervisor at the company for all guidance and support. Lastly, I would like to thank Rosmeriany Nahan-Suomela for the help and guidance she has provided me during this process.

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8 APPENDICES

Appendix 1. Interview guide

1. Introduction

- A. *Do I have your approval to record this interview?*
- B. *What is your name and which company do you represent?*
- C. *What kind of position do you have in the company?*
- D. *Can your name and answers be used in my thesis?*
- E. *What kind of experience do you have with international trade to Norway?*

2. Heavy lift

- A. *How would you describe Heavy lift?*
- B. *What would you say is the most common challenges or difficulties when working with goods that are categorized as heavy lift?*
- C. *What do you think is important to consider when working with heavy lift?*

3. Risks & risk management

- A. *How have you experienced the transport of heavy lift goods to Norway? Has there been any accidents, damage to goods or delays?*
- B. *What about the finance, has there been any difficulties? Such as late payments, interest rates, penalties or other additional expenses.*
- C. *How have you experienced the communication & cooperation between different parties in the organization that has been involved in the heavy lift operations? How about the sharing information and material?*
- D. *How have you experienced the communication and cooperation between different parties **outside** the organization (customers, suppliers, transportation company, etc.) involved in the heavy lift operations? How about the sharing of information and material?*

4. Logistics & distribution

- E. *What delivery terms (incoterms) has been used for the transportation of heavy lift goods to Norway? Why?*
- F. *How have you experienced the functionality of the incoterms?*
- G. *Which mode(s) of transport has been used in the transport of heavy lift goods to Norway? Why?*
- H. *How did you experience the functionality of the mode(s) of transport used?*

5. Documentation

- A. *What documents are required in the transport from Finland to Norway?*
- B. *Has there been any difficulties or challenges with the documentation?*
- C. *Is there something with the documentation that should be considered particularly when it comes to Norway?*

6. Norway

- A. *Is there any rules and regulations in Norway that should be considered when transporting heavy lift?*
- B. *In your experience, has these rules caused any difficulties?*
- C. *What causes the most challenges in transport of heavy lift inside the borders of Norway?*
- D. *In case you have been involved in the export of heavy lift to Norway, do you handle the customs process yourself or through a representative?*
- E. *How have you experienced the customs process to Norway progress when heavy lift has been exported from Finland?*
- F. *What documents does the customs require when exporting to Norway?*
- G. *Are you aware of any customs restrictions that affect the export of heavy lift?*
- H. *Do you have any experience with temporary export to Norway?*

Appendix 2. Description of the interview respondents

INTERVIEW RESPONDENTS	
A	<ul style="list-style-type: none"> • Heavy lift and Project cargo Coordinator • 5 year work experience of organizing transport for various goods worldwide, including heavy lift transformers.
B	<ul style="list-style-type: none"> • Heavy lift and Project cargo Coordinator • 3 year work experience of organizing transport for various goods worldwide, including heavy lift transformers.
C	<ul style="list-style-type: none"> • Heavy lift and Project cargo Coordinator, Trainee • Few months experience of organizing transport for various goods, including heavy lift transformers.
D	<ul style="list-style-type: none"> • Transport manager • Experience in various tasks such as sales, administration and providing transport services such as transport, installation, etc. • 20 year experience of working for businesses that operates with oversized transport
E	<ul style="list-style-type: none"> • Area Sales Manager • 5 year experience as a project manager for projects directed to Scandinavia, 3 year experience in sales with Sweden and Norway as the main sales areas
F	<ul style="list-style-type: none"> • Sales Manager • 8 year experience in transport and logistics sales, tender calculations and project management in some extent
G	<ul style="list-style-type: none"> • Project manager • Approximately one year experience in current position • Managed a few projects directed to Norway from disposal to delivery, until site installations
H	<ul style="list-style-type: none"> • Customer Service Specialist • 3 year experience in current position • Booking transport, both export and import, for many separate departments • Responsible for the communication with contracted carriers in Sweden and Finland • Assists with import and export declarations for various types of goods